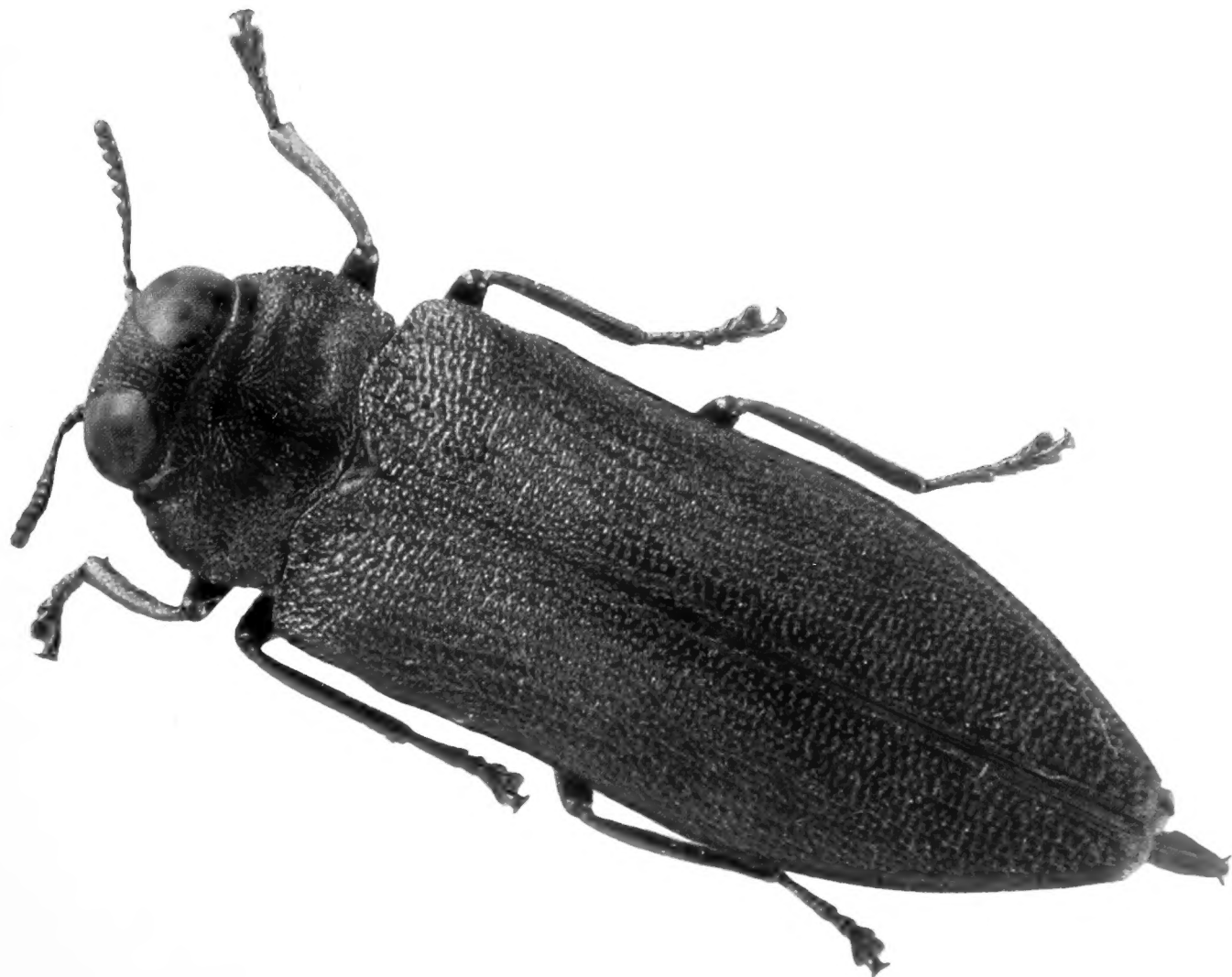


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**On the *Nazeris* fauna of China I.  
The species of the Qinling Shan, the Daba Shan,  
and adjacent mountain ranges  
(Coleoptera: Staphylinidae: Paederinae)**

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**Abstract.** Sixteen species of *Nazeris* Fauvel, 1873 are recognized in the Qinling Shan, the Daba Shan, and adjacent mountain ranges in Central China. Fourteen of them are described for the first time, illustrated, and distinguished from geographically close congeners: *N. acutus* sp. n. (S-Shaanxi: Daba Shan), *N. angulatus* sp. n. (Shaanxi/Chongqing/Hubei: Daba Shan), *N. bisinuosus* sp. n. (S-Shaanxi: Daba Shan), *N. clavatus* sp. n. (W-Hubei: Daba Shan), *N. compressus* sp. n. (Shaanxi/Chongqing: Daba Shan), *N. cultellatus* sp. n. (S-Shaanxi, Henan, Anhui), *N. custoditus* sp. n. (S-Gansu: Qinling Shan), *N. dilatatus* sp. n. (S-Shaanxi/N-Sichuan: Micang Shan), *N. extensus* sp. n. (S-Shaanxi: Daba Shan), *N. longilobatus* sp. n. (S-Gansu: mountains SE Longnan), *N. micangicus* sp. n. (S-Shaanxi: Micang Shan), *N. parvincisus* sp. n. (S-Shaanxi: Daba Shan), *N. rectus* sp. n. (W-Hubei: Daba Shan), *N. sociabilis* sp. n. (S-Gansu: mountains SE Longnan). The species are keyed and their distributions are mapped. Based on their external and male sexual characters, they represent five lineages. A checklist of the *Nazeris* species of China and Taiwan is compiled. The genus now includes 143 species and seven subspecies; 66 of them have been reported from mainland China.

**Key words.** Taxonomy, Staphylinidae, Paederinae, *Nazeris*, Qinling Shan, Daba Shan, China, new species, distribution maps, key to species.

## INTRODUCTION

*Nazeris* Fauvel, 1873 is currently assigned to the subtribe *Astenina* of the tribe *Paederini*. The monophyly of the genus is constituted particularly by the morphology of the aedeagus, which is characterized by the presence of a pair of dorso-lateral apophyses (see discussion in Assing 2009), a unique character among *Paederinae*. All known *Nazeris* species are micropterous, flightless, and have more or less restricted distributions, which suggests that the genus is probably a phylogenetically old taxon and that the current distribution, especially distribution gaps, may be interpreted primarily as a result of extinction rather than expansion by dispersal and colonization events.

According to the Palaearctic Catalogue (Smetana 2004), an update of this catalogue (Schülke unpubl.), and a manuscript (Assing unpubl.), *Nazeris* is currently represented in the Palaearctic region sensu Smetana (2004) by 121 species and seven subspecies. Eleven species are known from the West Palaearctic (Assing 2009), thirteen from the Himalaya (North India and Nepal), 25 species and six subspecies from Japan (exclusive of the doubtful record of *N. siamensis* Rougemont, 1988), one species from South Korea, 19 species and one subspecies from Taiwan, and 52 species from mainland China. Only eight additional species have been reported from adjacent parts of the Oriental region, suggesting that the distribution of

the genus is essentially Palaearctic (Assing 2009). Seven species were described from North Vietnam (Ito 2010a, b, Jarrige 1948, Watanabe 1996), and Rougemont (1988) described *N. siamensis* from northern Thailand. According to Smetana (2004), this species was subsequently recorded also from Japan. However, I have been unable to trace the primary record, nor is there an entry of such a record in Lee Herman's unpublished catalogue (Herman, pers. comm.). In view of the flightlessness and generally restricted distributions of *Nazeris* species, it seems likely that the record of *N. siamensis* from Japan is based on an error.

In mainland China, *Nazeris* ranks second among the paederine genera with respect to the diversity of micropterous species with restricted distributions, outnumbered in described species only by *Lathrobium* Gravenhorst, 1802 (Assing 2013). The provinces with the greatest diversity of previously described *Nazeris* species are Zhejiang (15 species) and Yunnan (11), followed by Sichuan (8), Guangxi (6), Anhui (3), Jiangxi (2), Fujian (2), Shaanxi (2), Xizang (2), and Guizhou (1). For details see the checklist provided in this paper. The two species from Shaanxi are the only ones that had been recorded from the Qinling Shan, none was known from the Daba Shan. Not a single species had been reported from Gansu and Hubei.

The Qinling Shan is a geologically old mountain range in central China with an east-west extension of approximately 650 km from southern Gansu in the east to Henan in the west. The highest peak of the Qinling Shan is the Taibai Shan at 3,767 m. This mountain range separates the temperate north of China from the south, whose climate is mainly influenced by subtropical monsoon. Data on the geology, geography, and climate were compiled by Ratschbacher et al. (2003) and Rost (1993). Adjacent to the Qinling Shan is the Daba Shan, a mountain range reputed for its glacial relicts and extending along the border between Shaanxi, Sichuan, and Chongqing eastwards into western Hubei (Fig. 1). The Shennongjia massif forms the easternmost part of the range and has the highest peaks, with six peaks ranging in altitude from 3,000 to 3,105 m.

During a joint field trip to Shaanxi, Gansu, and Sichuan conducted by Michael Schülke, David Wrase (both Berlin), and the author, five undescribed *Nazeris* species were collected in the Qinling Shan and the adjacent Mincang Shan (southern Shaanxi and southern Gansu provinces). An examination of material collected during earlier field trips to the Qinling Shan and the Daba Shan by Michael Schülke and David Wrase yielded ten additional undescribed species.

## MATERIAL AND METHODS

The morphological studies were conducted using a Steini SV 11 microscope (Zeiss Germany) and a Jenalab compound microscope (Carl Zeiss Jena). A digital camera (Nikon Coolpix 995) was used for the photographs. The maps were created using MapCreator 2.0 (primap) software.

Body length was measured from the anterior margin of the mandibles (in resting position) to the abdominal apex, the length of the forebody from the anterior margin of the mandibles to the posterior margin of the elytra, head length from the anterior margin of the frons to the posterior margin of the head, elytral length at the suture from the apex of the scutellum to the posterior margin of the elytra, and the length of the aedeagus from the apex of the ventral process to the base of the aedeagal capsule. The “parameral” side (i.e., the side where the sperm duct enters) is referred to as the ventral, the opposite side as the dorsal aspect.

For a discussion of the terminology of the aedeagal morphology see Assing (2009).



**Fig. 1.** Geographic position of the Qinling Shan and the Daba Shan in China. The frame marks the limits of the distribution maps.

## COLLECTION MATERIAL DEPOSITORIES

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ZFMK	Zoologisches Forschungsmuseum Alexander Koenig, Bonn
cAss	author's private collection
cSch	private collection Michael Schülke, Berlin

## RESULTS

### Diversity and distribution

Including the new species described below, *Nazeris* now includes 143 species, with 66 species known from mainland China. Fourteen species are described from the south of Gansu province, from Hubei, Shaanxi, Sichuan, the border between Shaanxi and Chongqing, Henan, and Anhui. Thus, the genus is now represented in the study region by a total of 16 species, 15 of them endemic. Six species are known from the Qinling Shan and adjacent mountain ranges, two from the Micang Shan, and eight from other parts of the Daba Shan.

The available data suggest that the *Nazeris* species of the study region are locally endemic. Only *N. cultellatus* has a less restricted distribution, which ranges from the central parts of the Qinling Shan eastwards to the Tianzhushan in Anhui. In general, closely related species, particularly hypothesized adelphotaxa, are at the same time geographically close, suggesting that the separation of gene pools and ensuing speciation was – at least primarily – initiated by local geological and climatic events.

### Species groups

Intragenetic phylogenetic affiliations had not been addressed previously. Based on external and male sexual characters, the *Nazeris* fauna of the study region is represented by five lineages.

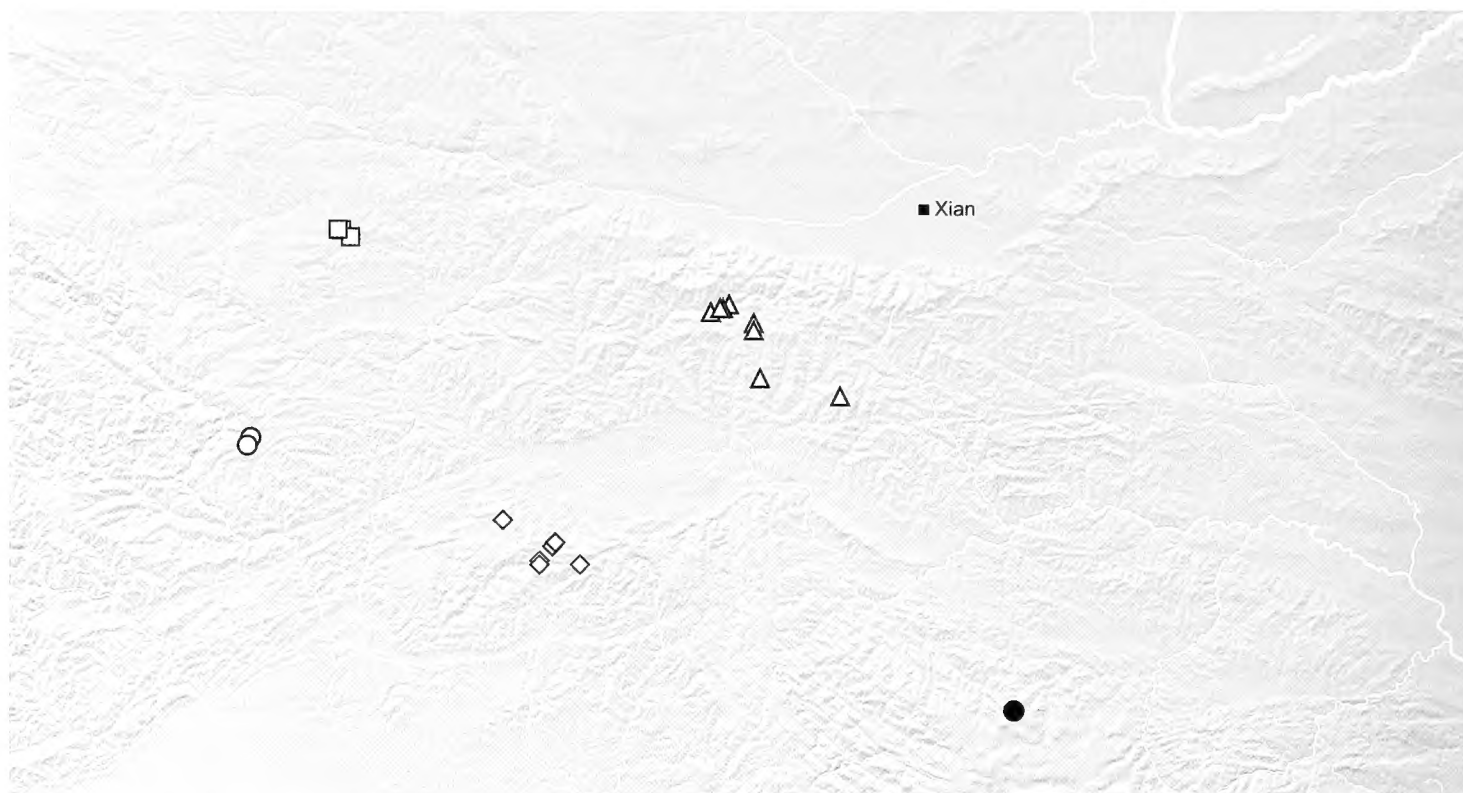
The *N. shaanxiensis* group includes five species (*N. shaanxiensis*, *N. custoditus*, *N. sociabilis*, *N. micangicus*, *N. dilatatus*) distributed in the Qinling Shan and the Micang Shan and is characterized by an aedeagus with a short and stout ventral process and with short and stout dorso-lateral apophyses, as well as by a broad and usually not very deep posterior excision of the male sternite VIII. Among the species of this group, *N. dilatatus* from the Micang Shan takes a somewhat isolated position, since it differs from the other representatives by rather numerous characters (coloration; modified shape of male sternite VII; relatively deep and broad posterior excision of male sternite VIII; apices of dorso-lateral apophyses obliquely truncate and with small tooth-like projections).

The *N. parvincisus* group is represented by a single species, *N. parvincisus* from the Daba Shan. It is characterized by an aedeagus with a short and stout, apically convex ventral process and with short and stout dorso-lateral apophyses, a small posterior excision of the male sternite VII, strongly convex eyes, coarse and dense punctation of the abdomen, especially of tergites III–VI (punctation of tergite VI as dense and coarse as that of tergite IV), and coarse, dense, and partly confluent punctation of the pronotum and elytra. The similar general morphology of the aedeagus (short and broad ventral process, relatively short and stout dorso-lateral apophyses) suggests that the *N. parvincisus* group is most closely affiliated with the *N. shaanxiensis* group.

The most diverse and widespread species group is the *N. longilobatus* group, which comprises six species, *N. longilobatus* and *N. huanghaoi* from the Qinling Shan, as well as *N. clavatus*, *N. rectus*, *N. bisinuosus*, and *N. acutus* from the Daba Shan. This lineage is characterized by the morphology of the ventral process of the aedeagus (slender and in ventral view acute, dorsally mostly with membranous extensions), the mostly long, slender, and distinctly sclerotized dorso-lateral apophyses, and a relatively deep and mostly narrow posterior excision of the aedeagus. Based on the external and male sexual characters, three species pairs are identified. One is represented by *N. longilobatus* + *N. huanghaoi* (relatively large body size, long elytra, similar morphology of the aedeagus), one by *N. clavatus* + *N. rectus* (non-areolate punctation of the head; similar morphology of the aedeagus), and one by *N. bisinuosus* + *N. acutus* (small body size, similar morphology of the aedeagus).

The *N. extensus* group includes two species distributed in the Daba Shan: *N. extensus* and *N. angulatus*. The monophyly of this group is constituted particularly by the derived morphology of the aedeagus (ventral process slender, weakly sclerotized, and with pronounced dorsal extensions; dorso-lateral apophyses long and slender, sub-basally sinuate and apically straight) and by the conspicuously coarse and granulose punctation of the head. In addition, the species of this group share a slender habitus, a pronotum with an uneven surface (in posterior half on either side with elevations and irregularly distributed punctation) and not particularly dense punctation, and a male sternite VIII with a relatively small and somewhat V-shaped posterior excision. Based on the general morphology of the aedeagus, the *N. extensus* group is probably most closely affiliated with the *N. longilobatus* group.

The *N. cultellatus* group includes two species, *N. cultellatus* from the Qinling Shan and *N. compressus* from the Daba Shan. These species share a derived morphology of the aedeagus (ventral process laterally conspicuously compressed, ventral face forming a sharp edge), as well as rather small body size (length of forebody 2.3–2.8 mm), relatively pale coloration (forebody reddish to dark-



**Fig. 2.** Distributions of species of the *N. shaanxiensis* group (open symbols) and of the *N. parvincis* group (filled symbol): *N. sociabilis* (open circles); *N. custoditus* (open squares); *N. dilatatus* (open diamonds); *N. shaanxiensis* (open triangles); *N. parvincis* (filled circles).

brown), the non-areolate punctation of the head, and a relatively small and broad posterior excision of the male sternite VIII.

### Ecology

The examined material was mainly collected in various forest habitats, both deciduous and coniferous, by sifting leaf litter and moss. The altitudes where the endemic species were found range from 1070 to 2400 m, with the majority of records ranging from 1400 to 2100 m. In Henan and Anhui, *N. cultellatus* was also collected at altitudes below 1000 m. On numerous occasions two or three species were found together in the same samples. Except for *N. acutus* and *N. bisinuosus* (one observation), syntopic species belonged to different species groups. Teneral adults were represented in the material of three species, *N. micangicus* (August), *N. dilatatus* (August), and *N. rectus* (July).

### The *Nazeris shaanxiensis* species group

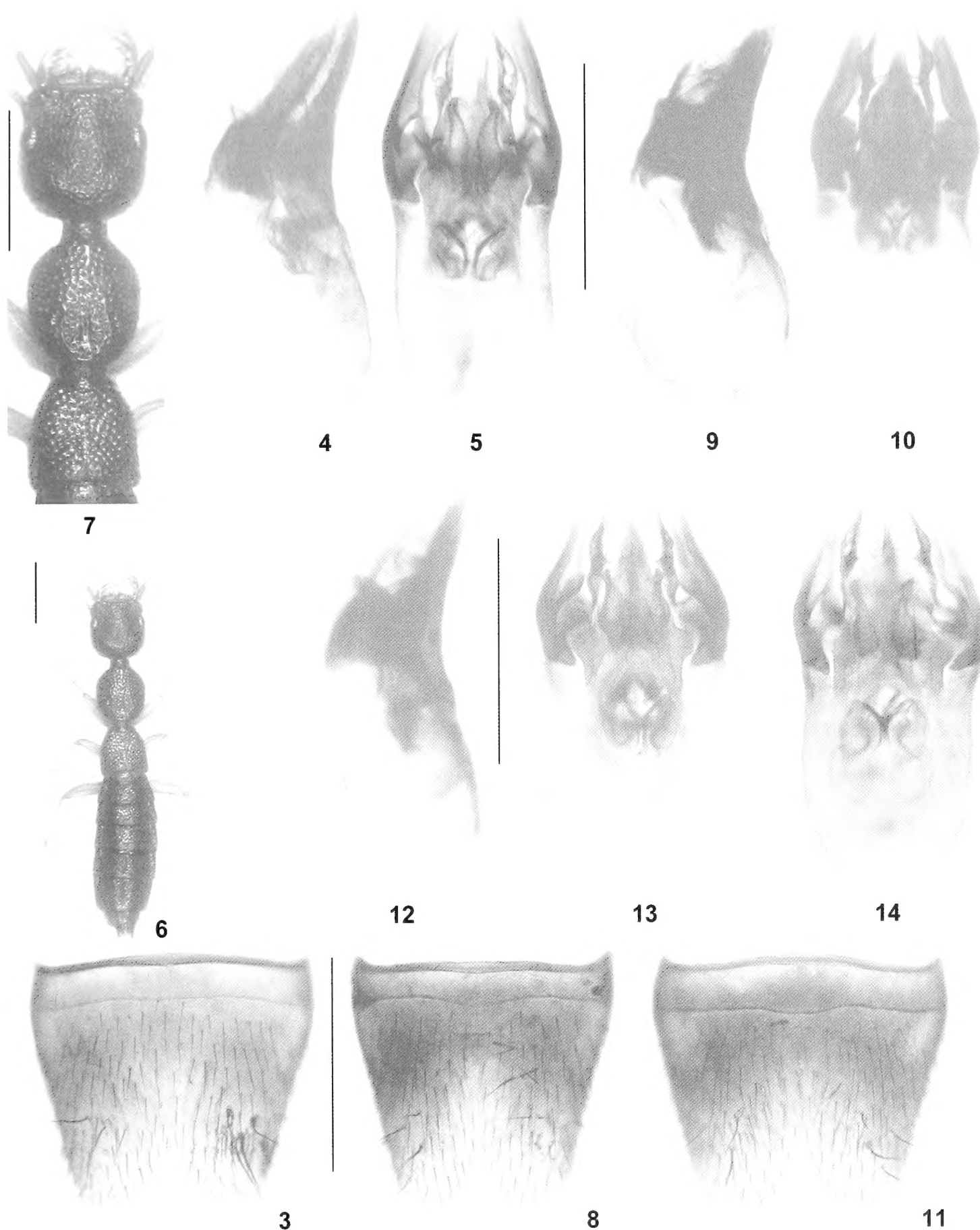
#### *Nazeris shaanxiensis* Hu & Li, 2010 (Figs 2–5)

**Type material examined.** Paratypes: 1♂: “Foping, Shaanxi Prov., alt. 1250–1400 m, 18-VII-2004, HU Jia-

Yao, TANG Liang & ZHU Li-Long leg. / [Paratype] *Nazeris shaanxiensis* HU & LI, 2010, SHNU Collections” (cAss); 1♀: “West Sangongli Gou, Houzhenzi, Zhouzhi County, Shaanxi Prov. / N 33.50.613 E 107.48.524, alt. 1336 m, 17–19-V-2008, HUANG Hao & XU Wang leg. / [Paratype] *Nazeris shaanxiensis* HU & LI, 2010, SHNU Collections” (cAss).

**Additional material examined. China: S-Shaanxi:** 2♂, 4♀, Qinling Shan, pass on road Zhouzhi-Foping, 105 km SW Xi’an, 33°46’N, 107°58’E, 1700 m, N-slope, small creek valley, mixed deciduous forest, moss sifted, 3.VII.2001, leg. Schülke (cSch, cAss, ZFMK); 2♀, Qinling Shan, pass on road Zhouzhi-Foping, 105 km SW Xi’an, 33°44’N, 107°58’E, 1880 m, base of rocks, sifted, 4.VII.2001, leg. Schülke (cSch); 3♀, Qinling Shan, river bank above Houzhenzi, 115 km WSW Xi’an, 33°50’N, 107°47’E, 1450 m, mixed deciduous forest, moss sifted, 4.–5.VII.2001, leg. Schülke & Wrase (cSch, cAss).

**Diagnosis.** In external characters, *N. shaanxiensis* is highly similar to *N. custoditus* (see the following section). It is distinguished from this species only by the shape of the male sternite VIII (slightly more transverse and with slightly broader posterior excision) (Fig. 3), and by the shapes of the ventral process and of the dorso-lateral apophyses of the aedeagus (Figs 4–5).



**Figs 3–14.** *Nazeris shaanxiensis*, paratype (3–5), *N. custoditus* (6–10), and *N. sociabilis* (11–14). 3, 8, 11. Male sternite VIII. 4–5, 9–10, 12–14. Aedeagus in lateral and in ventral view. 6. Habitus. 7. Forebody. Scale bars: 6–7: 1.0 mm; 3–5, 8–14: 0.5 mm.

**Distribution and natural history.** This species is endemic to the Qinling Shan (environs of the Taibai Shan) (Fig. 2), where it was collected at altitudes of 1200–1880 m (Hu et al. 2010; material examined), occasionally together with *N. huanghaoi* and/or *N. cultellatus*.

***Nazeris custoditus* sp. n.** (Figs 2, 6–10)

**Type material.** Holotype ♂: “CHINA [5] - S-Gansu, N Chengxian, W-Qinling Shan, 34°10'17"N, 105°42'56"E, 1850 m, 29.VII.2012, V. Assing / Holotypus ♂ *Nazeris custoditus* sp. n., det. V. Assing 2012” (cAss). Paratypes: 1♀: “CHINA - S-Gansu [CH12-05], W-Qinling Shan, 47 km N Chengxian, 34°10'17"N, 105°42'56"E, 1850 m, mixed secondary forest margin, litter sifted, 29.VII.2012, M. Schülke” (ZFMK); 1♀: “CHINA [4] - S-Gansu, N Chengxian, W-Qinling Shan, 34°08'16"N, 105°46'42"E, 1760 m, 28.VII.2012, V. Assing” (cAss); 1♂: “CHINA [4b] - S-Gansu, N Chengxian, W-Qinling Shan, 34°08'16"N, 105°46'42"E, 1760 m, 28.VII.2012, V. Assing” (cAss); 1♀: “CHINA - S-Gansu [CH12-04], W-Qinling Shan, 43 km N Chengxian, 34°08'16"N, 105°46'42"E, 1760 m, N-slope, secondary deciduous forest margin, sifted, 28.VII.2012, M. Schülke” (cSch); 2♀: “CHINA [6] - S-Gansu, N Chengxian, W-Qinling Shan, 34°10'20"N, 105°42'10"E, 1830 m, 29.VII.2012, V. Assing” (cAss).

**Etymology.** The specific epithet is the past participle of the Latin verb *custodire* (to beware, to arrest, to keep in custody). It refers to the fact that the species was discovered in an area of non-evident military interest, which we were unaware of and which earned us a 7-hour custody and interrogation by military personnel.

**Description.** Body length 5.3–5.9 mm; length of forebody 2.8–3.0 mm. Habitus as in Fig. 6. Coloration: head and elytra dark-brown; pronotum usually blackish-brown, i.e., slightly darker than head and elytra; abdomen blackish-brown to blackish; legs and antennae yellowish.

Head (Fig. 7) indistinctly oblong, 1.02–1.06 times as long as broad, and of somewhat variable shape, postocular region weakly and evenly convex to strongly convex in dorsal view; punctation dense and areolate; interstices without microsculpture, reduced to narrow ridges, occasionally in median dorsal portion slightly broader; eyes of moderate size and moderately convex, approximately 1/3 as long as the distance from posterior margin of eye to posterior constriction of head. Antenna 1.5–1.7 mm long.

Pronotum (Fig. 7) approximately 1.15 times as long as broad and 0.85–0.90 times as broad as head; punctation non-areolate, distinctly coarser than that of head, dense but less so than that of head; interstices narrower than

diameter of punctures, glossy; impunctate midline narrow, mostly of more or less reduced length and sometimes present only in posterior half.

Elytra (Fig. 7) 0.55–0.60 times as long as pronotum; humeral angles obsolete; punctation dense and coarse, punctures denser and slightly less coarse than those of pronotum, sometimes shallower and less defined; interstices glossy. Hind wings completely reduced.

Abdomen approximately 1.20–1.25 times as broad as elytra; punctation dense and coarse on anterior tergites, gradually becoming less dense and finer towards posterior tergites; interstices without microsculpture and glossy; posterior margin of tergite VII without palisade fringe; posterior margin of tergite VIII weakly convex.

♂: sternites VI and VII unmodified; sternite VIII with unmodified pubescence, posterior excision relatively small and V-shaped, its depth approximately 1/5 the length of sternite (Fig. 8); aedeagus approximately 0.9 mm long; dorso-lateral apophyses strongly sclerotized, short, and stout, not reaching apex of median lobe (Figs 9–10).

**Comparative notes.** The similar external and male sexual characters suggest that *N. custoditus* is closely related to *N. shaanxiensis*. It is distinguished from that species by on average darker coloration, a somewhat broader posterior excision of the male sternite VIII, shorter, stouter and more strongly sclerotized dorso-lateral apophyses (in *N. shaanxiensis* projecting beyond apex of median lobe), and the differently shaped ventral process, particularly the rounded apex in ventral view (*N. shaanxiensis*: apex of ventral process acute in ventral view).

**Distribution and natural history.** The species was found in two localities in the western Qinling Shan, to the north of Chengxian (Fig. 2). The specimens were sifted from leaf litter in secondary deciduous and mixed forests and from a heap of rotting plants at altitudes of 1760–1850 m.

***Nazeris sociabilis* sp. n.** (Figs 2, 11–15)

**Type material.** Holotype ♂: “CHINA [13] - S-Gansu, mountains SE Longnan, sifted, 33°13'03"N, 105°14'55"E, 2080 m, 4.VIII.2012, V. Assing / Holotypus ♂ *Nazeris sociabilis* sp. n., det. V. Assing 2012” (cAss). Paratypes: 2♂, 2♀: same data as holotype (cAss); 3♂, 2♀: “CHINA: S-Gansu [CH12-13], Mts. 36 km SE Longnan, 33°13'03"N, 105°14'55"E, 2080 m, N-slope with mixed pine and birch forest, litter and mushrooms sifted, 4.VIII.2012, leg. M. Schülke” (cSch, cAss); 1♂, 1♀: same data, but “[CH12-13b] ... E-slope with mixed pine and birch forest, litter sifted” (cSch, cAss); 1♀: “CHINA [7] - S-Gansu, mountains SE Longnan, sifted, 33°13'20"N, 105°15'10"E, 2170 m, 31.VII.2012, V. Assing” (ZFMK); 1♂, 3♀: “CHINA: S-Gansu [CH12-

07], Mts. 36 km SE Longnan, 33°13'20"N, 105°15'10"E, 2170 m, N-slope with shrubs and scattered coniferous trees, litter & mushrooms sifted, 31.VII.2012, leg. M. Schülke" (cSch); 1♂: "CHINA [8] - S-Gansu, mountains SE Longnan, sifted, 33°11'20"N, 105°14'24"E, 2030 m, 31.VII.2012, V. Assing" (cAss); 1♂, 1♀: "CHINA [18] - S-Gansu, mountains SE Longnan, sifted, 33°11'17"N, 105°14'12"E, 2060 m, 7.VIII.2012, V. Assing" (cAss); 1♂: "CHINA [18a]- S-Gansu, mts. SE Longnan, nest of *Formica*, 33°11'17"N, 105°14'12"E, 2060 m, 7.VIII.2012, V. Assing" (cAss); 2♂, 1♀: "CHINA [18b]- S-Gansu, mountains SE Longnan, sifted, 33°11'16"N, 105°14'08"E, 2130 m, 7.VIII.2012, V. Assing" (cAss).

**Etymology.** The specific epithet (Latin, adjective: sociable) alludes to the fact that this species shares its habitat with *N. longilobatus*.

**Description.** Body length 4.8–6.0 mm; length of forebody 2.7–3.1 mm. Habitus as in Fig. 15. External characters, including coloration, similar to those of *N. custoditus*. Distinguished only by the male sexual characters.

♂: sternites VI and VII unmodified; sternite VIII (Fig. 11) of similar shape and chaetotaxy as that of *N. custoditus*; aedeagus approximately 0.9 mm long; dorso-lateral apophyses not reaching apex of median lobe (Figs 12–14).

**Comparative notes.** A distinction of *N. sociabilis* from *N. custoditus* is possible only based on the morphology of the aedeagus, particularly the different shape of the ventral process (broader and shorter, apically acute both in lateral and in ventral view). *Nazeris sociabilis* differs from *N. shaanxiensis* by the relative length of the apophyses (*N. shaanxiensis*: projecting beyond apex of median lobe), and the basally broader ventral process.

**Distribution and natural history.** The species is known only from a pass in a mountain range to the southeast of Longnan (Fig. 2), where the specimens were sifted from leaf litter, soil, moss, and fern roots beneath shrubs and in mixed forests at altitudes of 2030–2170 m.

#### *Nazeris micangicus* sp. n. (Figs 16–21, 38)

**Type material.** Holotype ♂: "CHINA [28]- S-Shaanxi, Micang Shan, 34 km S Hanzhong, 32°44'22"N, 106°51'55"E, 1460 m, 14.VIII.2012, V. Assing / Holotypus ♂ *Nazeris micangicus* sp. n., det. V. Assing 2012" (cAss). Paratypes: 1♂, 1♀: same data as holotype (cAss); 1♂, 1♀ [partly teneral]: "CHINA: S-Shaanxi [CH12-28], Micang Shan, 34 km S Hanzhong, 32°44'22"N, 106°51'55"E, 1460 m, W-slope, deciduous forest margin with bamboo, litter, grass, and moss sifted, 14.VIII.2012, leg. M. Schülke" (cSch); 1♂, 1♀ [partly teneral]: "CHI-

NA: S-Shaanxi [CH12-28], Micang Shan, 34 km S Hanzhong, 32°44'22"N, 106°51'55"E, 1460 m, W-slope, deciduous forest margin with bamboo, litter, grass, and moss sifted, 14.VIII.2012, leg. M. Schülke" (cSch); 1♂, 1♀ [partly teneral]: "CHINA (S-Shaanxi), Micang Shan, 34 km S Hanzhong, 32°44'22"N, 106°51'55"E, 1460 m, W.slope, margin of deciduous forest with bamboo, ferns, litter, roots, soil sifted, 14.VIII.2012 D.W. Wrase [28]" (cAss, ZFMK).

**Etymology.** The specific epithet is an adjective derived from Micang, the name of the mountain range where the species was discovered.

**Description.** Body length 5.2–5.8 mm; length of forebody 2.8–3.0 mm. Habitus as in Fig. 16. External characters as in *N. custoditus* (Fig. 7), distinguished only by the male sexual characters.

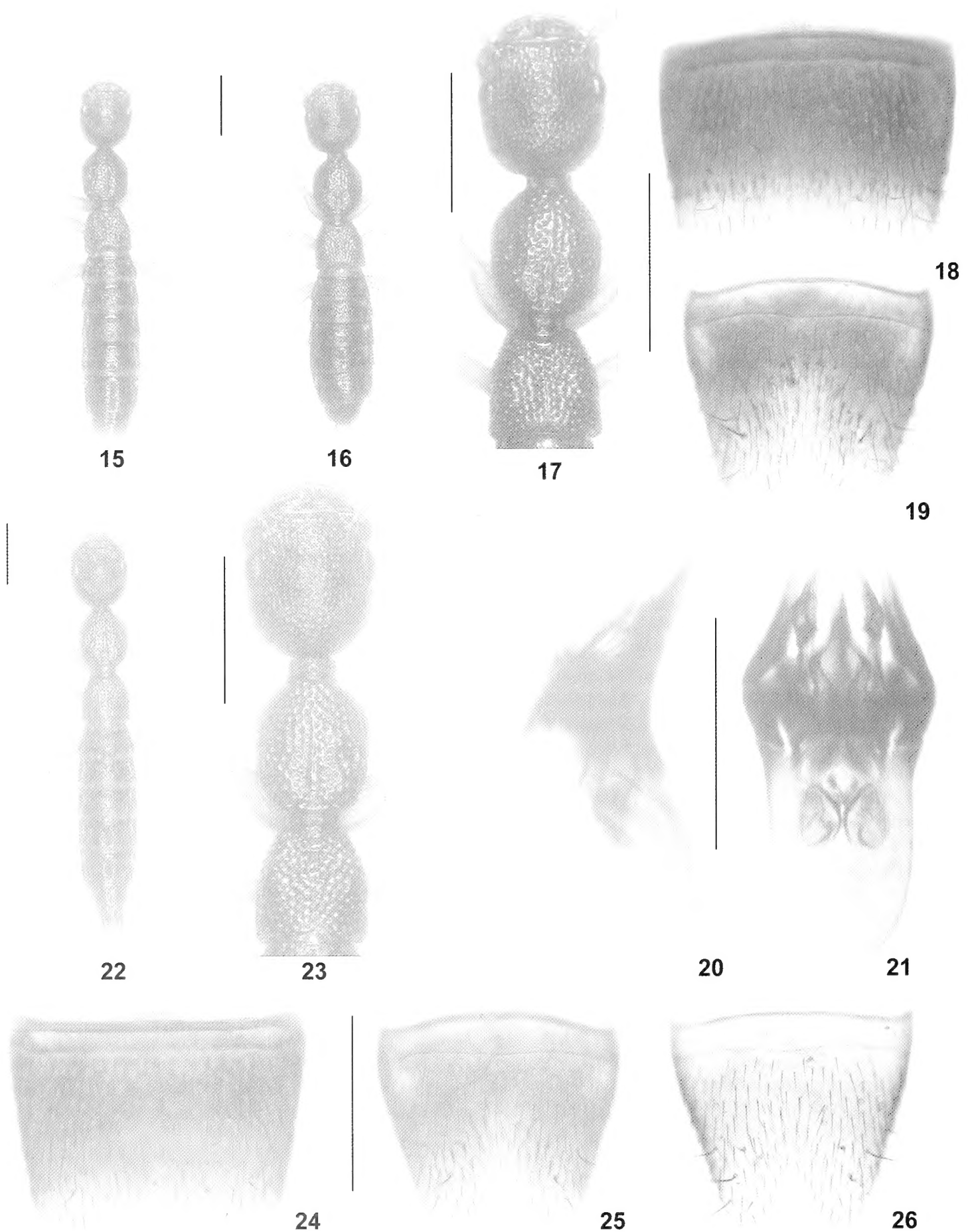
♂: sternite VI unmodified; posterior margin of sternite VII weakly convex in the middle, almost truncate (Fig. 18); sternite VIII with unmodified pubescence, posterior excision V-shaped and moderately deep, its depth nearly 1/4 the length of sternite (Fig. 19); aedeagus approximately 0.85 mm long; dorso-lateral apophyses strongly sclerotized, short, and stout, not reaching apex of median lobe (Figs 20–21).

**Comparative notes.** Based on the external and male sexual characters, *N. micangicus* is closely allied to *N. shaanxiensis*, *N. custoditus*, and *N. sociabilis*. It is reliably distinguished from them only based on the male sexual characters. It differs from *N. shaanxiensis* particularly by the shorter dorso-lateral apophyses, from *N. custoditus* by on average paler coloration, the broad and slightly deeper posterior excision of the male sternite VIII, and the shape of the median lobe of the aedeagus (shorter and broader in ventral view; apex more acute in ventral and in lateral view), and from *N. sociabilis* by the smaller aedeagus and the more slender and apically more acute ventral process of the median lobe.

**Distribution and natural history.** The type locality is situated in the Micang Shan some 35 km to the south of Hanzhong in southern Shaanxi (Fig. 38). The specimens were sifted from leaf litter, grass roots, and moss in a deciduous forest with bamboo at an altitude of 1460 m. Some of the paratypes are slightly teneral.

#### *Nazeris dilatatus* sp. n. (Figs 2, 22–31)

**Type material.** Holotype ♂: "CHINA [30] - S-Shaanxi, Micang Shan, 33 km S Hanzhong, 32°44'44"N, 106°52'46"E, 1360 m, 15.VIII.2012, V. Assing / Holotypus ♂ *Nazeris dilatatus* sp. n., det. V. Assing 2012" (cAss).



**Figs 15–26.** *Nazeris sociabilis* (15), *N. micangicus* (16–21), and *N. dilatatus* (22–26). 15–16, 22. Habitus. 17, 23. Forebody. 18, 24. Male sternite VII. 19, 25–26. Male sternite VIII. 20–21. Aedeagus in lateral and in ventral view. Scale bars: 15–17, 22–23: 1.0 mm; 18–21, 24–26: 0.5 mm.

Paratypes: 2♂: same data as holotype (cAss); 2♂, 3♀ [partly teneral]: “CHINA [27a]-S-Shaanxi [recte: N-Sichuan], Micang Shan, 42 km S Hanzhong, 32°40'52"N, 106°49'16"E, 1090 m, 14.VIII.2012, V. Assing” (cAss); 2♂, 2♀ [partly teneral]: “CHINA: S-Shaanxi [CH12-30], Micang Shan, 33 km S Hanzhong, 32°44'44"N, 106°52'46"E, 1360 m, stream valley, forest margin, litter and soil sifted, 15.VIII.2012, M. Schülke” (cSch); 2♂: “CHINA (S-Shaanxi) Micang Shan, 33 km S Hanzhong, 32°44'44"N, 106°52'46"E, 1360 m, (stream valley, shady brookside with bamboo, deciduous [sic] shrubs, litter, moss, soil sifted) 15.VIII.2012 D.W. Wrase [30B]” (cAss); 1♂, 1♀: “CHINA: S-Shaanxi [recte: N-Sichuan] [CH12-27], Micang Shan, 42 km S Hanzhong, 32°40'52"N, 106°49'16"E, 1090 m, NW-slope, mixed forest margin with rocks, litter, grass, and moss sifted, 14.VIII.2012, leg. M. Schülke” (cSch); 3♂, 1♀: “CHINA [29] - S-Shaanxi, Micang Shan, 30 km S Hanzhong, 32°45'56"N, 106°53'57"E, 1070 m, 15.VIII.2012, V. Assing” (cAss, ZFMK); 1♂: “CHINA: S-Shaanxi [CH12-29], Micang Shan, 30 km S Hanzhong, 32°45'56"N, 106°53'57"E, 1070 m, stream valley, litter and soil sifted, 15.VIII.2012, leg. M. Schülke” (cSch); 1♀: “CHINA (S-Shaanxi) Micang Shan, 30 km S Hanzhong, 1070 m, 32°45'56"N, 106°53'57"E, (stream valley, litter, soil sifted) 15.VIII.2012 D.W. Wrase [29]” (cSch); 2♂ [teneral]: “CHINA [32] - S-Shaanxi [recte: N-Sichuan], Micang Shan, 42 km S Hanzhong, 32°40'43"N, 106°48'33"E, 1090 m, 17.VIII.2012, V. Assing” (cAss); 1♂, 2♀ [partly teneral]: “CHINA: S-Shaanxi [recte: N-Sichuan] [CH12-32], Micang Shan, 42 km S Hanzhong, 32°40'43"N, 106°48'33"E, 1090 m, stream valley, shady S-slope, sec. mixed forest, litter, grass, and herbs near path sifted, 17.VIII.2012, M. Schülke” (cSch); 1♂, 1♀ [♀ teneral]: “CHINA: S-Shaanxi [CH12-31], Micang Shan, 40 km SW Hanzhong, 32°52'25"N, 106°37'11"E, 1530 m, N-slope, mixed secondary forest, litter and moss sifted, 16.VIII.2012, leg. M. Schülke” (cSch, cAss); 1♂: “CHINA (S-Shaanxi) Micang Shan, 40 km SW Hanzhong, 1530 m, 32°52'25"N, 106°37'11"E (N.slope, mixed secondary forest, litter, moss sifted) 16.VIII.2012 D.W. Wrase [31]” (cSch); 10♂, 7♀ [identified by J.-Y. Hu]: “China: Sichuan Prov., Bazhong City, Nanjiang Coun., Micangshan, N32.39.825 E107.01.788, alt. 1800 m, 27~28-IV-2008, Huang Hao & Xu Wang leg.” (SNUC).

**Comment.** The data for the paratypes deposited in the SNUC were communicated to me by J.-Y. Hu. His identification was confirmed based on photographs of the male primary and secondary sexual characters.

**Etymology.** The specific epithet (Latin adjective: dilated) refers to the characteristic shape of the ventral process of the aedeagus.

**Description.** Body length 5.5–6.5 mm; length of forebody 2.8–3.2 mm. Habitus as in Fig. 22. Coloration: forebody in mature specimens uniformly dark-brown to blackish brown; abdomen blackish; legs and antennae yellowish. Other external characters (Fig. 23) as in *N. custoditus*.

♂: sternite VI unmodified; posterior margin of sternite VII convexly produced in the middle (Fig. 24); sternite VIII with unmodified pubescence, posterior excision broadly V-shaped and rather deep, its depth nearly 1/3 the length of sternite (Figs 25–26); aedeagus approximately 0.85 mm long, median lobe with distinct lateral projections and apically acute in ventral view; dorso-lateral apophyses not reaching apex of median lobe, apically obliquely truncate and with small tooth-like projection directed towards median lobe (Figs 27–31).

**Intraspecific variation.** The shape of the ventral process of the aedeagus (lateral view) and of the posterior margin of the male sternite VII are slightly variable (Figs 25–28).

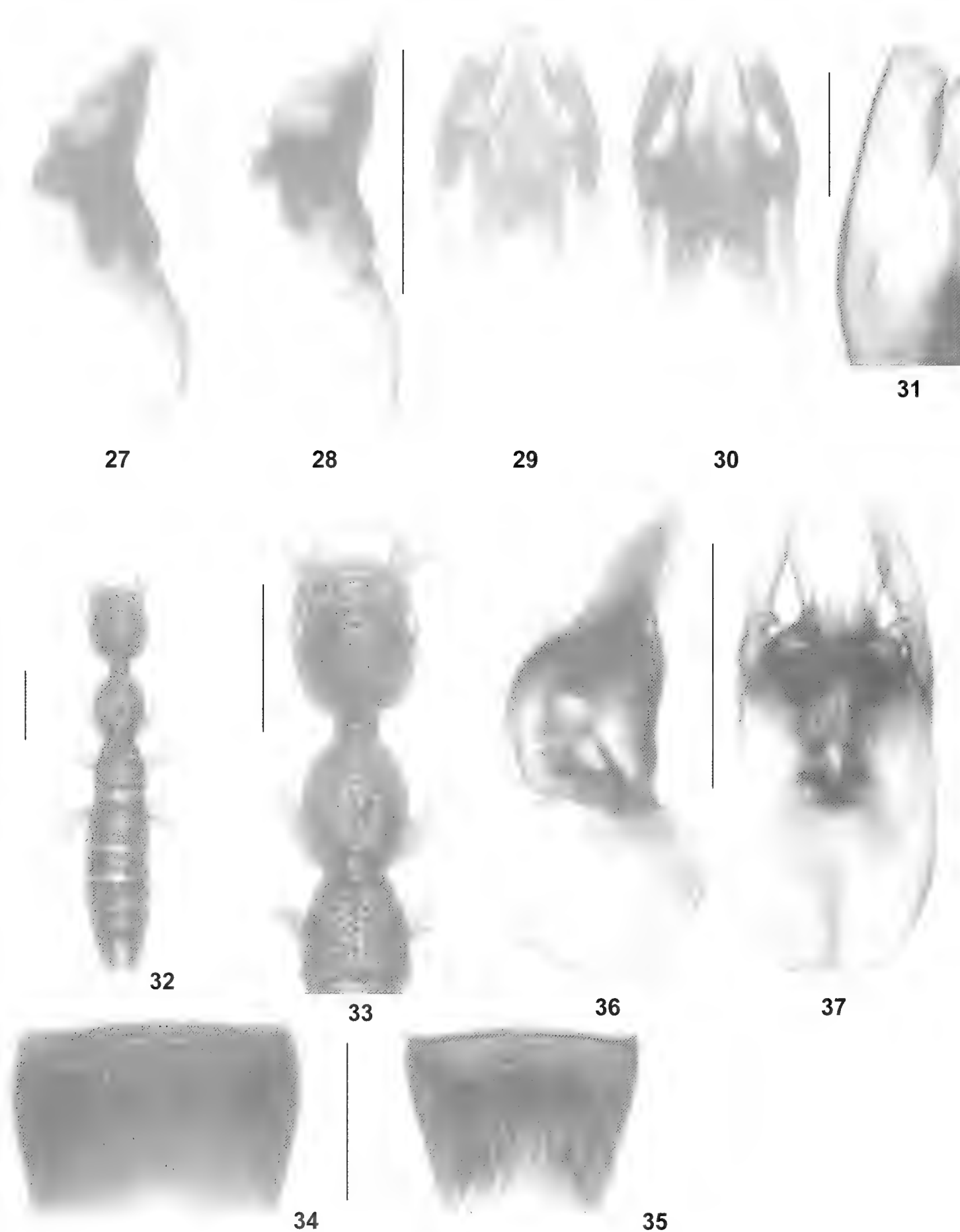
**Comparative notes.** *Nazeris dilatatus* is readily distinguished from other geographically close congeners by the conspicuous shape of the posterior margin of the male sternite VII, as well as by the characteristic shapes of the ventral process and of the dorso-lateral apophyses of the aedeagus, from most species also by the deeper posterior excision of the male sternite VIII.

**Distribution and natural history.** The species was found in several localities in the Micang Shan to the south of Hanzhong in southern Shaanxi and in northern Sichuan (Fig. 2). The specimens from Sichuan were collected in mixed forests by sifting leaf litter and moss, and in vegetation composed of perennial herbs by shaking roots and scraping the soil. The altitudes range from 1070 to 1800 m. Several paratypes are teneral.

### The *Nazeris parvincisus* species group

#### *Nazeris parvincisus* sp. n. (Figs 2, 32–37)

**Type material.** Holotype ♂: “CHINA: S-Shaanxi (Daba Shan), SE pass, 22 km NW Zhenping, 32°00'N, 109°21'E, 1930 m, 11.VII.2001, leg. M. Schülke [C01-10] / mixed deciduous forest (sifted) [C01-10] / Holotypus ♂ *Nazeris parvincisus* sp. n., det. V. Assing 2012” (cAss). Paratypes: 1♂: same data as holotype (cAss); 1♂: “CHINA: Border Shaanxi - Sichuan [now Chongqing] (Daba Shan), pass 20 km SSE Zhenping, 1700–1800 m, 31°44'N, 109°35'E, 12.VII.2001, leg. M. Schülke [C01-07C] / mixed forest, small creek valley, moss, bark (sifted) [C01-07C]” (cSch).



**Figs 27–37.** *Nazeris dilatatus* (27–31) and *N. parvincis* (32–37). 27–30, 36–37. Aedeagus in lateral and in ventral view. 31. Dorso-lateral apophysis of aedeagus in ventral view. 32. Habitus. 33. Forebody. 34. Male sternite VII. 35. Male sternite VIII. Scale bars: 32–33: 1.0 mm; 27–30, 34–37: 0.5 mm; 31: 0.1 mm.

**Etymology.** The specific epithet (Latin, adj.: with small incision) refers to the shape of the male sternite VIII.

**Description.** Body length 5.5–6.0 mm; length of forebody 2.9–3.0 mm. Habitus as in Fig. 32. Coloration: body blackish-brown to black; legs and antennae yellowish.

Head (Fig. 33) weakly oblong, approximately 1.05 times as long as broad; punctation coarse, dense, and not areolate; interstices without microsculpture; eyes relatively small, but strongly convex, approximately 1/4 as long as the distance from posterior margin of eye to posterior constriction of head. Antenna approximately 1.8–2.0 mm long.

Pronotum (Fig. 33) approximately 1.15 times as long as broad and approximately 0.8 times as broad as head; punctation non-areolate and dense, distinctly coarser than that of head; interstices glossy, forming narrow ridges; midline with short impunctate elevation in posterior half.

Elytra (Fig. 33) approximately 0.6 times as long as pronotum; humeral angles obsolete; punctation dense, defined, and coarse; interstices glossy. Hind wings completely reduced.

Abdomen approximately 1.2 times as broad as elytra; punctation dense, defined, and rather coarse, not distinctly sparser on tergite VI than on tergite IV; tergites VII and VIII with sparser and finer punctation than tergites III–VI; interstices without microsculpture and glossy; posterior margin of tergite VII without palisade fringe; posterior margin of tergite VIII weakly convex.

♂: sternite VI unmodified; posterior margin of sternite VII with small and indistinct concavity in the middle (Fig. 34); sternite VIII with unmodified pubescence, posterior excision small (though somewhat variable), its depth only 0.10–0.15 times the length of sternite (Fig. 35); aedeagus stout, approximately 0.85 mm long; ventral process apically convex and with deep median incision in ventral view; dorso-lateral apophyses short, curved, stout, slightly projecting beyond apex of ventral process (Figs 36–37).

**Comparative notes.** *Nazeris parvincisus* is distinguished from the syntopic *N. extensus* by the darker coloration, the less coarse punctation of the head, the denser punctation of the head and pronotum, the less uneven surface of the posterior proportion of the pronotum, the longer antennae, the denser and coarser punctation of the abdominal tergite VI, the different shape of the male sternite VIII, and by the completely different morphology of the aedeagus.

**Distribution and natural history.** The species was found in two localities in the Daba Shan, to the northwest and south-southeast of Zhenping, in southern Shaanxi and in the border region between Shaanxi and Chongqing. The specimens were sifted from leaf litter and moss in mixed forests at altitudes 1700–1930 m, partly together with *N. extensus*, *N. compressus*, and/or *N. angulatus*.

## The *Nazeris longilobatus* species group

### *Nazeris longilobatus* sp. n. (Figs 38–46)

**Type material.** Holotype ♂: “CHINA [18b]- S-Gansu, mountains SE Longnan, sifted, 33°11'16"N, 105°14'08"E, 2130 m, 7.VIII.2012, V. Assing / Holotypus ♂ *Nazeris longilobatus* sp. n., det. V. Assing 2012” (cAss). Paratypes: 1♀: same data as holotype (cAss); 2♀: “CHINA (S.Gansu), Mts. 38 km SE Longnan, 2130 m, 33°11'16"N, 105°14'08"E, (W.slope with scree, scrubs, trees, litter, soil, moss sifted) 7.VIII.2012 D.W. Wrase [18B]” (cSch); 2♂, 1♀: “CHINA [18] - S-Gansu, mountains SE Longnan, sifted, 33°11'17"N, 105°14'12"E, 2060 m, 7.VIII.2012, V. Assing” (cAss).

**Etymology.** The specific epithet is composed of the Latin adjectives *longus* (long) and *lobatus* (lobed) and alludes to the elongated dorso-lateral apophyses of the aedeagus.

**Description.** Body length 5.5–6.5 mm; length of forebody 3.0–3.2 mm. Habitus as in Fig. 39. Coloration: body in mature specimens uniformly blackish; legs and antennae yellowish.

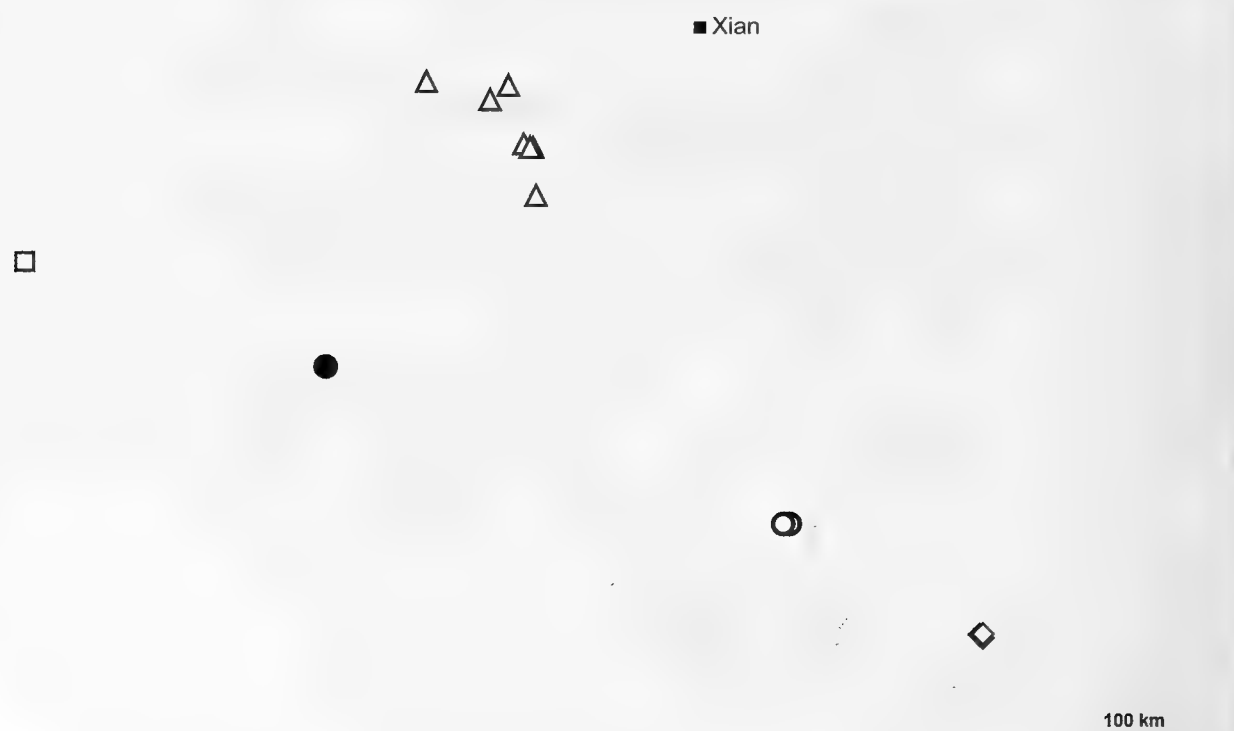
Head (Fig. 40) approximately as long as broad; punctation dense and areolate; interstices without microsculpture, reduced to narrow ridges; eyes of moderate size and distinctly convex, at least slightly less than 1/3 as long as the distance from posterior margin of eye to posterior constriction of head. Antenna 1.7–2.0 mm long.

Pronotum (Fig. 40) 1.10–1.14 times as long as broad and approximately 0.85 times as broad as head; punctation non-areolate, distinctly coarser than that of head, dense but less so than that of head; interstices narrower than diameter of punctures, glossy; impunctate midline narrow, mostly of more or less reduced length and sometimes present only in posterior half.

Elytra (Fig. 40) approximately 0.7 times as long as pronotum, or nearly so; humeral angles obsolete; punctation dense, defined, and coarse, nearly as coarse as that of pronotum; interstices glossy. Hind wings completely reduced.

Abdomen approximately 1.25 times as broad as elytra; punctation dense, defined, and relatively coarse on anterior tergites (Fig. 41), only slightly less dense and somewhat finer on posterior tergites (Fig. 42); interstices without microsculpture and glossy; posterior margin of tergite VII without palisade fringe; posterior margin of tergite VIII weakly convex.

♂: sternite VI unmodified; sternite VII (Fig. 43) shallowly depressed in the middle; sternite VIII with unmodified pubescence, posterior excision narrowly V-shaped and moderately deep, its depth nearly 0.3 times as long as the sternite (Fig. 44); aedeagus approximately 0.9 mm long; dorso-lateral apophyses long, distinctly curved in



**Fig. 38.** Distributions of species of the *N. longilobatus* group (open symbols) and of the *N. shaanxiensis* group (filled symbol): *N. longilobatus* (open square); *N. huanghaoi* (open triangles); *N. bisinuosus* (open circles); *N. rectus* (open diamonds); *N. micangicus* (filled circle).

ventral view, and nearly reaching apex of median lobe (Figs 45–46).

**Comparative notes.** This species is distinguished from the syntopic *N. sociabilis* by the darker coloration, on average larger body size, the broader head, the on average less oblong and posteriorly more strongly tapering pronotum, noticeably longer elytra, denser and more defined punctation on the abdomen (particularly noticeable on tergites VI and VII), the deeper and narrower posterior excision of the male sternite VIII, and by the much more slender median lobe of the aedeagus with much longer and more slender dorso-lateral apophyses. Based on the male sexual characters, *N. longilobatus* is closely related to *N. huanghaoi* from the environs of the Taibai Shan. It differs from this species by slightly larger size, the larger head, the more densely and less glossy abdomen, the less deep posterior excision of the male sternite VIII, by the different shape of the ventral process of the aedeagus, as well as by the distinctly bent dorso-lateral apophyses. For illustrations of *N. huanghaoi* see Hu et al. (2010) and Figs 47–49.

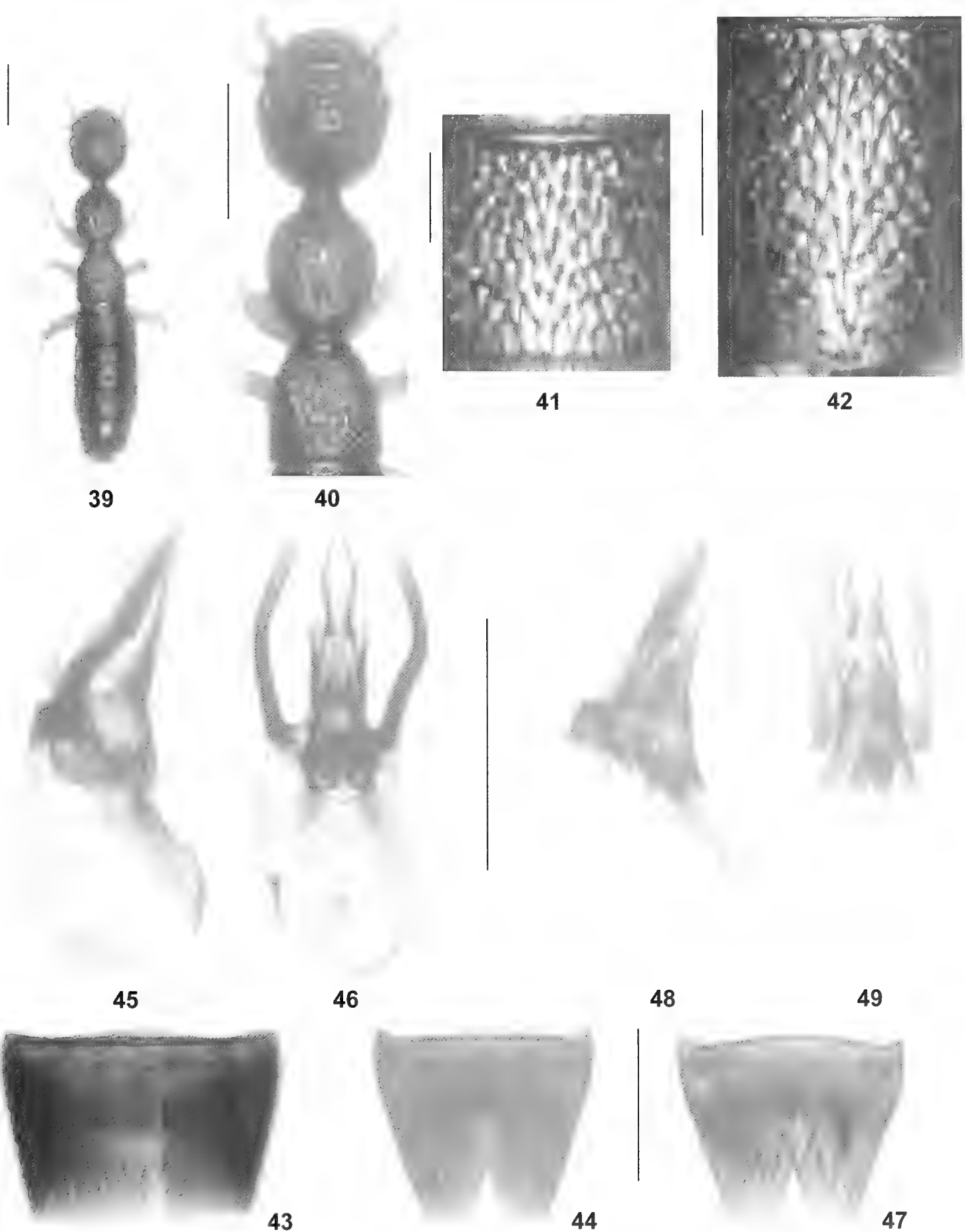
**Distribution and natural history.** The species is known only from one slope near a pass in a mountain range to the southeast of Longnan (Fig. 38). The specimens were

sifted from leaf litter, soil, and moss beneath shrubs at altitudes of 2060 and 2130 m, together with *N. sociabilis*.

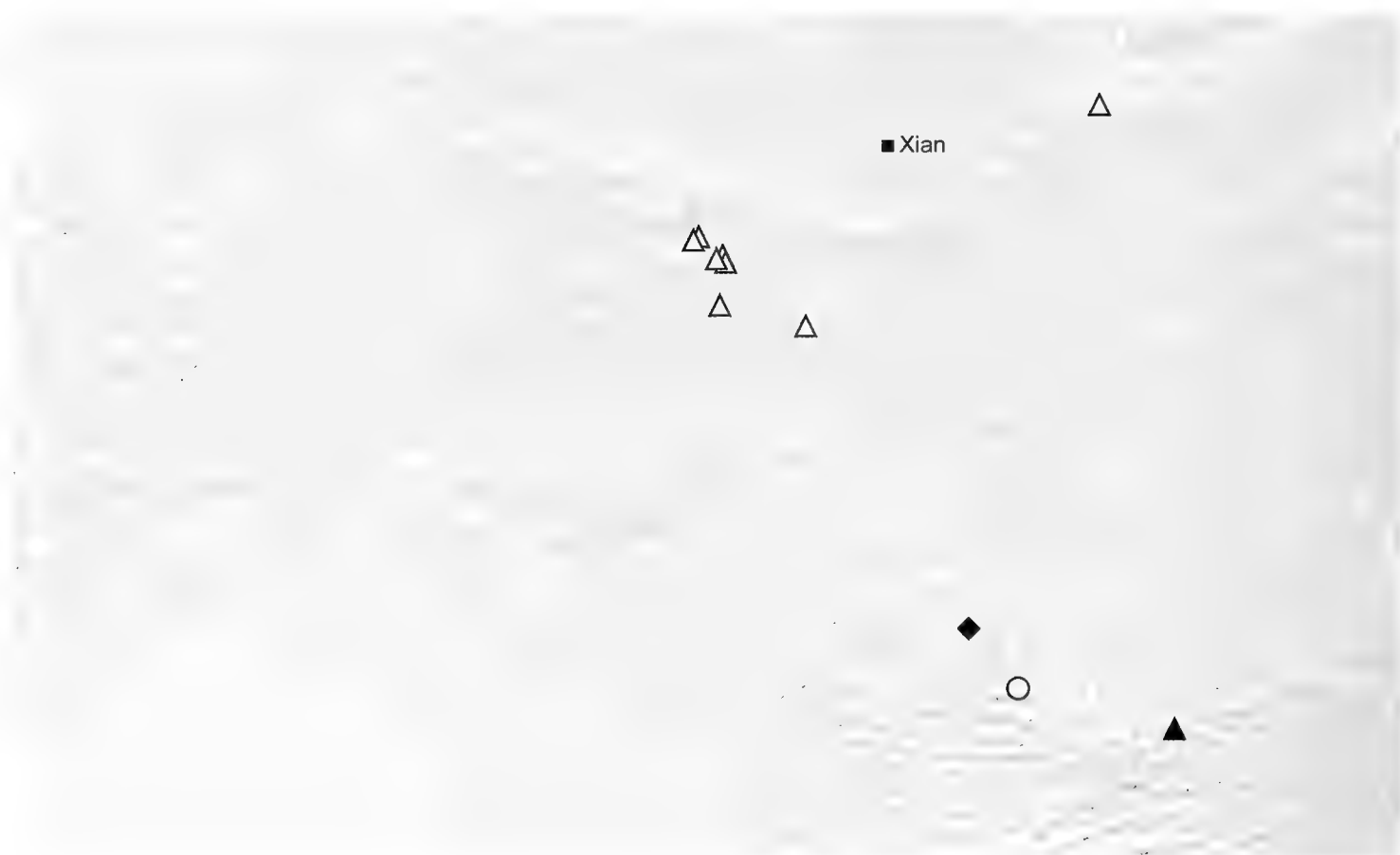
***Nazeris huanghaoi* Hu & Li, 2010** (Figs 38, 47–49)

**Type material examined.** Paratypes: 1♂, 1♀: “Daoban, Zhouzhi County, Shaanxi Prov., N 38.43.645 E 107.58.147 / alt. 1900 m, 4-V-2008, HUANG Hao & XU Wang leg. / [Paratype] *Nazeris huanghaoi* HU & LI, 2010, SHNU Collections” (cAss).

**Additional material examined.** China, S-Shaanxi: 1♂, 42 km SW Meixian, 34°02’N, 107°24’E, 1875 m, secondary deciduous forest near stream, litter and grass roots sifted, 24.VII.2012, leg. Schülke (cAss); 2♂, Qinling Shan, 108 km SW Xi’an, road km 93 S Zhouzhi, 33°45’N, 107°56’E, mountain forest, sifted, 1650 m, 1.–2.IX.1995, leg. Schülke (cSch); 3♂, 3♀, Qinling Shan, pass on road Zhouzhi-Foping, 105 km SW Xi’an, 33°44’N, 107°59’E, 1990 m, N-slope, small creek valley, mixed deciduous forest with bamboo, 2.&4.VII.2001, leg. Schülke (cSch, cAss); 2♂, 5♀, same data, but 33°44’N, 107°58’E, 1880 m, base of rocks, sifted, 4.VII.2001, leg. Schülke (cSch, cAss).



**Figs 39–49.** *Nazeris longilobatus* (39–46) and *N. huanghaoi*, paratype (47–49). 39. Habitus. 40. Forebody. 41. Median portion of abdominal tergite IV. 42. Median portion of abdominal tergite VII. 43. Male sternite VII. 44, 47. Male sternite VIII. 45–46, 48–49. Aedeagus in lateral and in ventral view. Scale bars: 39–40: 1.0 mm; 43–49: 0.5 mm; 41–42: 0.2 mm.



**Fig. 50.** Distributions of species of the *N. longilobatus* group (filled symbols) and of the *N. cultellatus* group (open symbols): *N. acutus* (filled diamond); *N. clavatus* (filled triangle); *N. cultellatus* (open triangles; records from Henan and Anhui not shown); *N. compressus* (open circle).

**Diagnosis.** *Nazeris huanghaoi* is most similar to *N. longilobatus* (see description above), but differs by slightly shorter elytra (approximately 0.65 times as long as pronotum), the sparser punctuation of the posterior abdominal tergites, the deeper and narrower posterior excision of the male sternite VIII (Fig. 47), and by the morphology of the aedeagus, particularly the less curved dorso-lateral apophyses (Figs 48–49).

**Distribution and natural history.** The species is endemic to the environs of the Taibai Shan in the Qinling Shan (Fig. 38), where it was collected in deciduous forests at elevations from approximately 1400 m up to 2065 m (Hu et al. 2010; material examined), in some localities together with *N. shaanxiensis* and/or *N. cultellatus*.

#### *Nazeris acutus* sp. n. (Figs 50–55)

**Type material.** Holotype ♂: “CHINA: S-Shaanxi (Daba Shan), NW pass 25 km NW Zhenping, 32°01’N, 109°19’E, 2150 m, 11.VII.2001, leg. M. Schülke [C01-09] / creek valley, young coniferous forest, moss (sifted) [C01-09] / Holotypus ♂ *Nazeris acutus* sp. n., det. V. Assing 2012” (cAss). Paratypes: 3♂, 1♀: same data as holotype (cSch, cAss); 1♀: “CHINA (S-Shaanxi) Daba

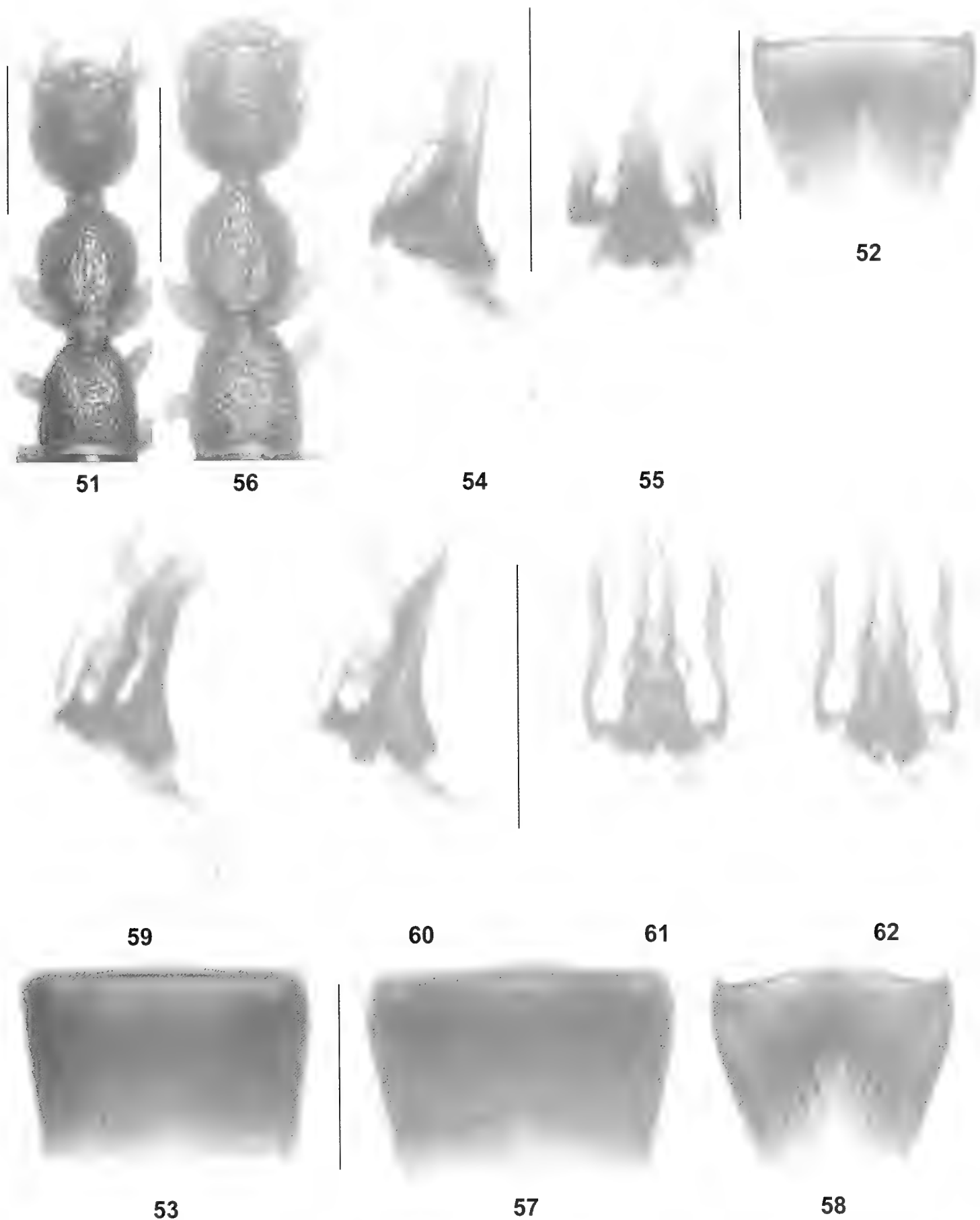
Shan, NW pass 25 km NW Zhenping, 32°01’N, 109°19’E, 2150 m (creek vall., young coniferous forest, moss) 11.VII.2001 Wrase [09]” (cSch).

**Etymology.** The specific epithet (Latin, adjective) refers to the conspicuously acute ventral process of the aedeagus.

**Description.** Small species; body length 4.3–5.7 mm; length of forebody 2.5–2.8 mm. Coloration: forebody brown to blackish-brown; abdomen dark-brown to black; legs and antennae yellowish.

Head (Fig. 51) weakly oblong, approximately 1.05 times as long as broad; punctuation coarse, dense, and distinctly areolate; interstices without microsculpture, forming narrow ridges; eyes of moderate size and distinctly convex, less than 1/3 as long as the distance from posterior margin of eye to posterior constriction of head. Antenna approximately 1.4–1.5 mm long.

Pronotum (Fig. 51) 1.10–1.15 times as long as broad and approximately 0.9 times as broad as head; punctuation coarse, non-areolate and dense; interstices much narrower than diameter of punctures, glossy; surface in posterior median and lateral portions somewhat uneven, midline and usually additional lateral patches impunctate (or more sparsely punctate) and somewhat elevated.



**Figs 51–62.** *Nazeris acutus* (51–55) and *N. bisinuosus* (56–62). 51, 56. Forebody. 53, 57. Male sternite VII. 52, 58. Male sternite VIII. 54–55, 59–62. Aedeagus in lateral and in ventral view. Scale bars: 51, 56: 1.0 mm; 52–55, 57–62: 0.5 mm.

Elytra (Fig. 51) approximately 0.65 times as long as pronotum; humeral angles obsolete; punctation dense, moderately defined, and moderately coarse, distinctly less so than that of pronotum; interstices glossy. Hind wings completely reduced.

Abdomen approximately 1.25 times as broad as elytra; punctation dense, defined, and not very coarse on tergites III–VI, somewhat sparser on tergite VI than on tergite IV; punctation of tergites VII and VIII sparser and finer than that of anterior tergites; interstices without microsculpture and glossy; posterior margin of tergite VII without palisade fringe; posterior margin of tergite VIII weakly convex.

♂: sternite VI unmodified; sternite VII not distinctly modified (Fig. 52); sternite VIII with unmodified pubescence, posterior excision narrow and rather deep, its depth approximately 0.3 times the length of sternite (Fig. 53); aedeagus approximately 0.85 mm long; ventral process conspicuously slender and acute both in lateral and in ventral view; dorso-lateral apophyses short and stout, much shorter than ventral process (Figs 54–55).

**Comparative notes.** Based on the similar external characters (punctation both of the forebody and of the abdomen, body proportions) and particularly the similar male sexual characters (sternite VIII with narrow and deep posterior excision; aedeagus with slender and apically very acute ventral process), *N. acutus* is allied to *N. longilobatus* and related species. It is distinguished from the syntopic and highly similar *N. bisinuus* by the distinctly denser punctation of the posterior tergites (that of tergite VI approximately as dense as that of tergite IV), by the deeper posterior excision of the male sternite VIII, as well as by the shorter and differently shaped dorso-lateral apophyses and the differently shaped ventral process of the aedeagus.

**Distribution and natural history.** The type locality is situated in the Daba Shan, to the northwest of Zhenping, in southern Shaanxi (Fig. 50). The specimens were sifted from moss in a young coniferous forest at an altitude of 2150 m, together with *N. bisinuus*.

#### *Nazeris bisinuus* sp. n. (Figs 38, 56–62)

**Type material.** Holotype ♂: “CHINA: S-Shaanxi (Daba Shan), mountain range N pass 22 km NW Zhenping, N-slope, 32°01'N, 109°21'E, 2400 m, 13.VII.2001, leg. M. Schülke [C01-11] / mixed forest (Pinus Salix and other deciduous trees) (sifted) [C01-11] / Holotypus ♂ *Nazeris bisinuus* sp. n., det. V. Assing 2012” (cAss). Paratypes: 8♂, 12♀: same data as holotype (cSch, cAss); 1♂, 1♀: “CHINA (S-Shaanxi) Daba Shan, mount. range N pass 22 km NW Zhenping, N-slope, 2400 m, 32°01'N, 109°21'E,

(mix. for., Pinus, Salix a. other decid. trees) 13.VII.2001 Wrase [11]” (cSch, ZFMK); 1♂: “CHINA: S-Shaanxi (Daba Shan), NW pass 25 km NW Zhenping, 32°01'N, 109°19'E, 2150 m, 11.VII.2001, leg. M. Schülke [C01-09] / creek valley, young forest, moss (sifted) [C01-09]” (cAss); 1♀: “CHINA (S-Shaanxi) Daba Shan, NW pass 25 km NW Zhenping, 32°01'N, 109°19'E, 2150 m (creek vall., young coniferous forest, moss) 11.VII.2001 Wrase [09]” (cSch).

**Etymology.** The specific epithet (Latin, adjective) refers to the bisinuate dorso-lateral apophyses of the aedeagus.

**Description.** Rather small species; body length 4.5–5.5 mm; length of forebody 2.5–2.8 mm. Coloration: body in mature specimens uniformly blackish; legs and antennae yellowish.

Head (Fig. 56) 1.00–1.05 times as long as broad; punctation dense and areolate; interstices without microsculpture, reduced to narrow ridges; eyes of moderate size and distinctly convex, less than 1/3 as long as the distance from posterior margin of eye to posterior constriction of head. Antenna 1.4–1.6 mm long.

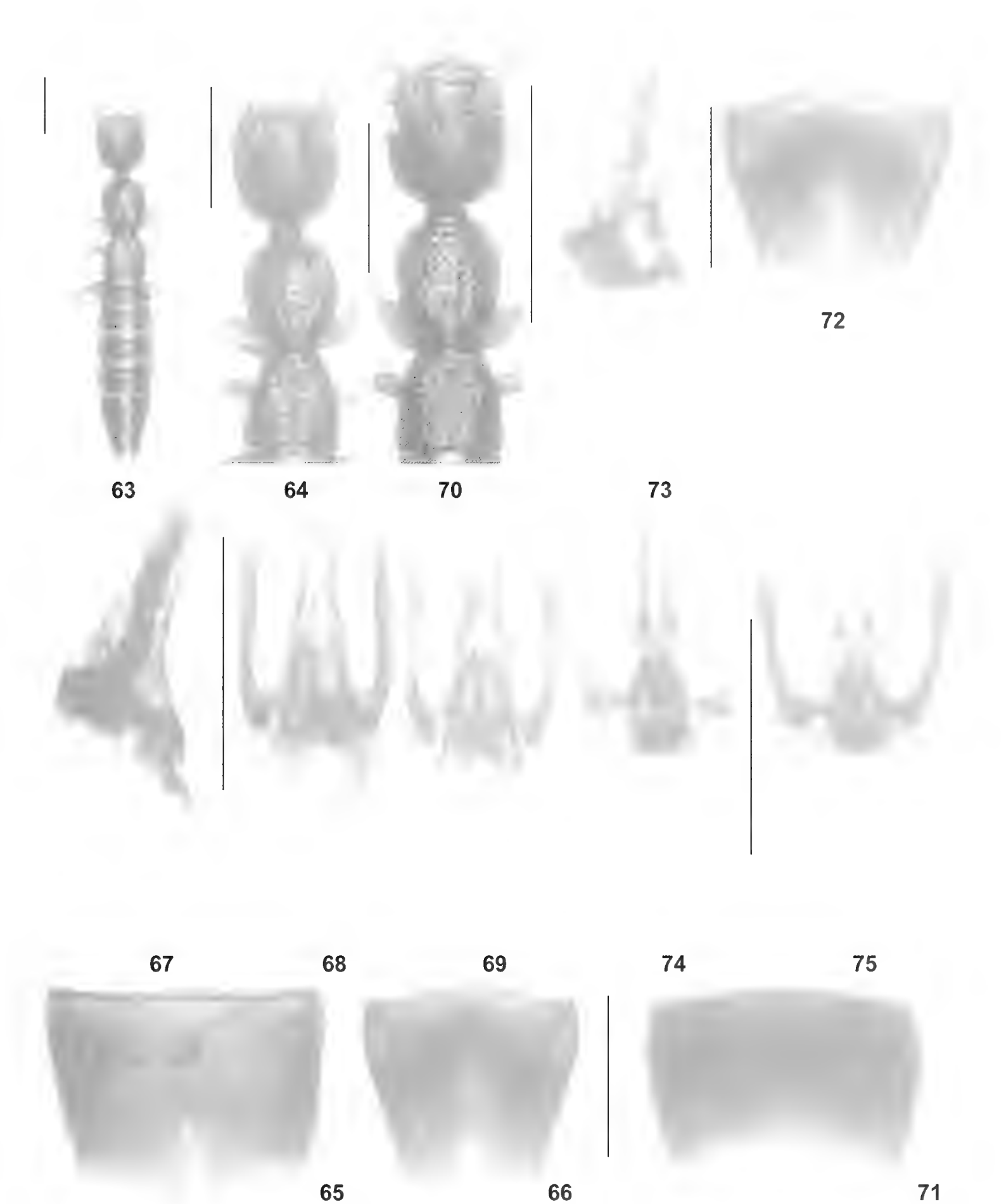
Pronotum (Fig. 56) 1.10–1.15 times as long as broad and approximately 0.85–0.90 times as broad as head; punctation non-areolate and dense; interstices narrower than diameter of punctures, glossy; midline with usually short and somewhat elevated longitudinal impunctate band in posterior half.

Elytra (Fig. 56) approximately 0.60–0.65 times as long as pronotum; humeral angles obsolete; punctation dense, defined, and coarse; interstices glossy. Hind wings completely reduced.

Abdomen approximately 1.25 times as broad as elytra; punctation dense, defined, and relatively coarse on anterior tergites, less dense and finer on posterior tergites; interstices without microsculpture and glossy; posterior margin of tergite VII without palisade fringe; posterior margin of tergite VIII weakly convex.

♂: sternite VI unmodified; sternite VII not distinctly modified (Fig. 57); sternite VIII with unmodified pubescence, posterior excision narrowly V-shaped and moderately deep, its depth nearly 0.25 times as long as the sternite (Fig. 58); aedeagus small, approximately 0.7 mm long; dorso-lateral apophyses long, bisinuate in ventral view; ventral process apically acute in ventral view and of characteristic shape in lateral view (Figs 59–62).

**Comparative notes.** Based on the external (black coloration, similar punctation) and sexual characters (shape of male sternite VIII; aedeagus with long and slender dorso-lateral apophyses and ventral process), *N. bisinuus* is allied to *N. longilobatus*, *N. huanghaoi*, and particularly *N. acutus*. It is distinguished from them by the sparser punctation of the posterior abdominal tergites, as well as



**Figs 63–75.** *Nazeris rectus* (63–69) and *N. clavatus* (70–75). 63. Habitus. 64, 70. Forebody. 65, 71. Male sternite VII. 66, 72. Male sternite VIII. 67–69, 73–75. Aedeagus in lateral and in ventral view. Scale bars: 63–64, 70: 1.0 mm; 65–69, 71–75: 0.5 mm.

by the distinctly bisinuate dorso-lateral apophyses and by the characteristic shape of the ventral process of the smaller aedeagus, from *N. huanghaoi* and *N. longilobatus* additionally by shorter elytra, and much shorter antennae.

**Distribution and natural history.** The species was found in two localities in the Daba Shan, to the northwest of Zhenping, in southern Shaanxi (Fig. 38). The specimens were sifted from leaf litter and moss in a mixed forest and in a young coniferous forest at elevations of 2150 and 2400 m, in one locality together with *N. acutus*.

***Nazeris rectus* sp. n.** (Figs 38, 63–69)

**Type material.** Holotype ♂: “China (W-Hubei) Daba Shan, pass E Mt. Da Shennongjia, 12 km NW Muyuping 31°30'N, 110°21'E 1950 m (dry creek vall., mix. decid. forest) 16.-22.VII.2001 Wrase [13] / Holotypus ♂ *Nazeris rectus* sp. n., det. V. Assing 2012” (cAss). Paratypes: 5♂, 7♀ [1♀ teneral]: same data as holotype (cSch, cAss); 7♂, 3♀: “CHINA: W-Hubei (Daba Shan), pass E of Mt. Da Shennongjia, 12 km NW Muyuping, 31°30'N, 110°21'E, 22.VII.2001, leg. M. Schülke [C01-13E] / creek valley, 1950–2050 m, mixed deciduous forest, moss, dead wood, mushrooms (sifted) [C01-13E]” (cSch, cAss); 7♂, 3♀: “CHINA: W-Hubei (Daba Shan), pass E of Mt. Da Shennongjia, 12 km NW Muyuping, 31°30'N, 110°21'E, 19.VII.2001, leg. M. Schülke [C01-13C] / creek valley, 1950–2050 m, mixed deciduous forest, moss, dead wood, mushrooms (sifted) [C01-13C]” (cSch, cAss); 2♂, 7♀ [1♀ teneral]: “CHINA: W-Hubei (Daba Shan), creek valley 8 km NW Muyuping, 31°29'N, 110°22'E, 1550–1650 m, 18.VII.2001, leg. M. Schülke [C01-16A] / creek valley, deciduous forest, moss (sifted) [C01-16A]” (cSch, cAss, ZFMK); 4♂, 2♀: “CHINA: W-Hubei (Daba Shan), creek valley 11 km NW Muyuping, 31°30'N, 110°22'E, 1960 m, 18.VII.2001, leg. M. Schülke [C01-17] / creek valley, mixed deciduous forest (sifted) [C01-17]” (cSch, cAss); 2♂, 2♀: “CHINA (W-Hubei) Daba Shan), creek vall. 11 km NW Muyuping, 31°30'N, 110°22'E, 1960 m (creek vall., mix. decid. for., moss, leaves-sift.) 18.VII.2001 Wrase [17]” (cSch, cAss); 1♂ [identified by J.-Y. Hu]: “China: Hubei Prov., Shennongjia N. R., Xiaolongtan, 5-VIII-2002, Li & Tang leg.” (SNUC).

**Comment.** The data for the paratype deposited in the SNUC were communicated to me by J.-Y. Hu. His identification was confirmed based on photographs of the male primary and secondary sexual characters.

**Etymology.** The specific epithet (Latin, adjective: straight) refers to the shape of the dorso-lateral apophyses of the aedeagus, one of the characters distinguishing this species from the closely related *N. bisinuosus*.

**Description.** Body length 5.5–6.7 mm; length of forebody 2.9–3.2 mm. Habitus as in Fig. 63. Coloration: body blackish; legs and antennae dark-yellowish.

Head (Fig. 64) approximately as long as broad; punctation coarse, dense, and non-areolate; interstices without microsculpture, forming narrow ridges; eyes of moderate size and distinctly convex, less than 1/3 as long as the distance from posterior margin of eye to posterior constriction of head. Antenna approximately 1.5–1.7 mm long.

Pronotum (Fig. 64) 1.12–1.17 times as long as broad and approximately 0.85 times as broad as head; punctation non-areolate and dense, slightly coarser than that of head; interstices glossy, forming narrow ridges; in posterior half with more or less pronounced, short impunctate median band, laterally often with more or less irregular, more sparsely punctate areas.

Elytra (Fig. 64) approximately 0.65 times as long as pronotum; humeral angles obsolete; punctation dense, moderately defined, and coarse, but less than that of pronotum; interstices glossy. Hind wings completely reduced.

Abdomen approximately 1.2 times as broad as elytra; punctation dense, defined, and rather coarse on tergites III–V, only slightly sparser on tergite VI than on tergite IV, distinctly sparser and finer on tergites VII and VIII than on anterior tergites; interstices without microsculpture and glossy; posterior margin of tergite VII without palisade fringe; posterior margin of tergite VIII weakly convex.

♂: sternite VI unmodified; sternite VII in the middle of posterior margin indistinctly concave (Fig. 65); sternite VIII with unmodified pubescence, posterior excision narrow and rather deep, its depth approximately 0.3 times the length of sternite (Fig. 66); aedeagus slender, 0.80–0.85 mm long; ventral process slender and acute in lateral view; dorso-lateral apophyses long and almost straight, nearly reaching apex of ventral process (Figs 67–69).

**Comparative notes.** Based on the male sexual characters (deep and narrow posterior incision of sternite VIII, morphology of the aedeagus), *N. rectus* belongs to the *N. longilobatus* group. It is distinguished from other species of this group particularly by the non-areolate punctation of the head, which it shares only with *N. clavatus*, and by the shape of the dorso-lateral apophyses of the aedeagus. It differs from the syntopic *N. angulatus* by the denser and less coarse punctation of the forebody, the non-areolate punctation of the broader head, darker coloration, denser punctation of the abdomen, and by the completely different male sexual characters.

**Distribution and natural history.** The species was found in three localities to the northwest of Muyuping in the eastern Daba Shan, western Hubei (Fig. 38). The specimens were sifted from leaf litter and moss in mixed deciduous forests at altitudes of 1550–2050 m, together with *N. angulatus*. Two of the paratypes are teneral.

*Nazeris clavatus* sp. n. (Figs 50, 70–75)

**Type material.** Holotype ♂: “CHINA: W-Hubei (Daba Shan), mountain range NE Muyuping, pass 12 km N Muyuping, 31°32'N, 110°26'E, 2380, leg. M. Schülke [C01-15] / 17.VII.2001, N pass, N-slope with young deciduous forest, bank of small creek, moss (sifted) [C01-15] / Holotypus ♂ *Nazeris clavatus* sp. n., det. V. Assing 2012” (cAss). Paratypes: 9♂, 8♀: same data as holotype (cSch, cAss); 3♂, 4♀: same data, but “[C01-15C] ... 21.VII.2001” (cSch, cAss, ZFMK).

**Etymology.** The specific epithet (Latin, adjective) refers to the club-shaped dorso-lateral apophyses of the aedeagus.

**Description.** Body length 3.5–5.5 mm; length of forebody 2.5–2.8 mm. Coloration: body blackish, abdominal segments IX–X and posterior margin of segment VIII reddish; legs and antennae dark-yellowish.

Head (Fig. 70) approximately as long as broad; punctuation coarse, dense, and non-areolate; interstices without microsculpture, forming narrow ridges; eyes of moderate size and distinctly convex, less than 1/3 as long as the distance from posterior margin of eye to posterior constriction of head. Antenna approximately 1.5 mm long.

Pronotum (Fig. 70) 1.10–1.15 times as long as broad and 0.85–0.90 times as broad as head; punctuation non-areolate and dense, slightly coarser than that of head; interstices glossy, forming narrow ridges; in posterior half with more or less pronounced impunctate median band, laterally often with more or less irregular, more sparsely punctate areas.

Elytra (Fig. 70) approximately 0.6 times as long as pronotum; humeral angles obsolete; punctuation dense, moderately defined, less so than that of pronotum; interstices glossy. Hind wings completely reduced.

Abdomen approximately 1.25 times as broad as elytra; punctuation dense, defined, and rather coarse on tergites III–V, somewhat sparser on tergite VI than on tergite IV, distinctly sparser and finer on tergites VII and VIII than on anterior tergites; interstices without microsculpture and glossy; posterior margin of tergite VII without palisade fringe; posterior margin of tergite VIII weakly convex.

♂: sternites III–VI unmodified; posterior margin of sternite VII weakly concave (Fig. 71); sternite VIII with unmodified pubescence, posterior excision somewhat V-shaped and moderately deep, its depth nearly 0.25 times the length of sternite (Fig. 72); aedeagus 0.8–0.9 mm long; ventral process very narrow and apically acute in lateral view, strongly dilated dorsad in lateral view; dorso-lateral apophyses moderately stout and club-shaped, far from reaching apex of ventral process (Figs 73–75).

**Comparative notes.** Based on the male sexual characters (rather deep posterior incision of sternite VIII, morphology of the aedeagus), *N. clavatus* belongs to the *N. longilobatus* group. It is distinguished from all the species of this group by the shape of the dorso-lateral apophyses of the aedeagus and, except for its hypothesized adelphotaxon *N. rectus*, by the non-areolate punctuation of the head. It additionally differs from the geographically close *N. rectus* by smaller body size.

**Distribution and natural history.** The type locality is situated in the eastern Daba Shan, to the north of Muyuping, western Hubei (Fig. 50). The specimens were sifted from leaf litter and moss in a young deciduous forest at an altitude of 2380 m.

The *Nazeris extensus* species group*Nazeris extensus* sp. n. (Figs 76–82)

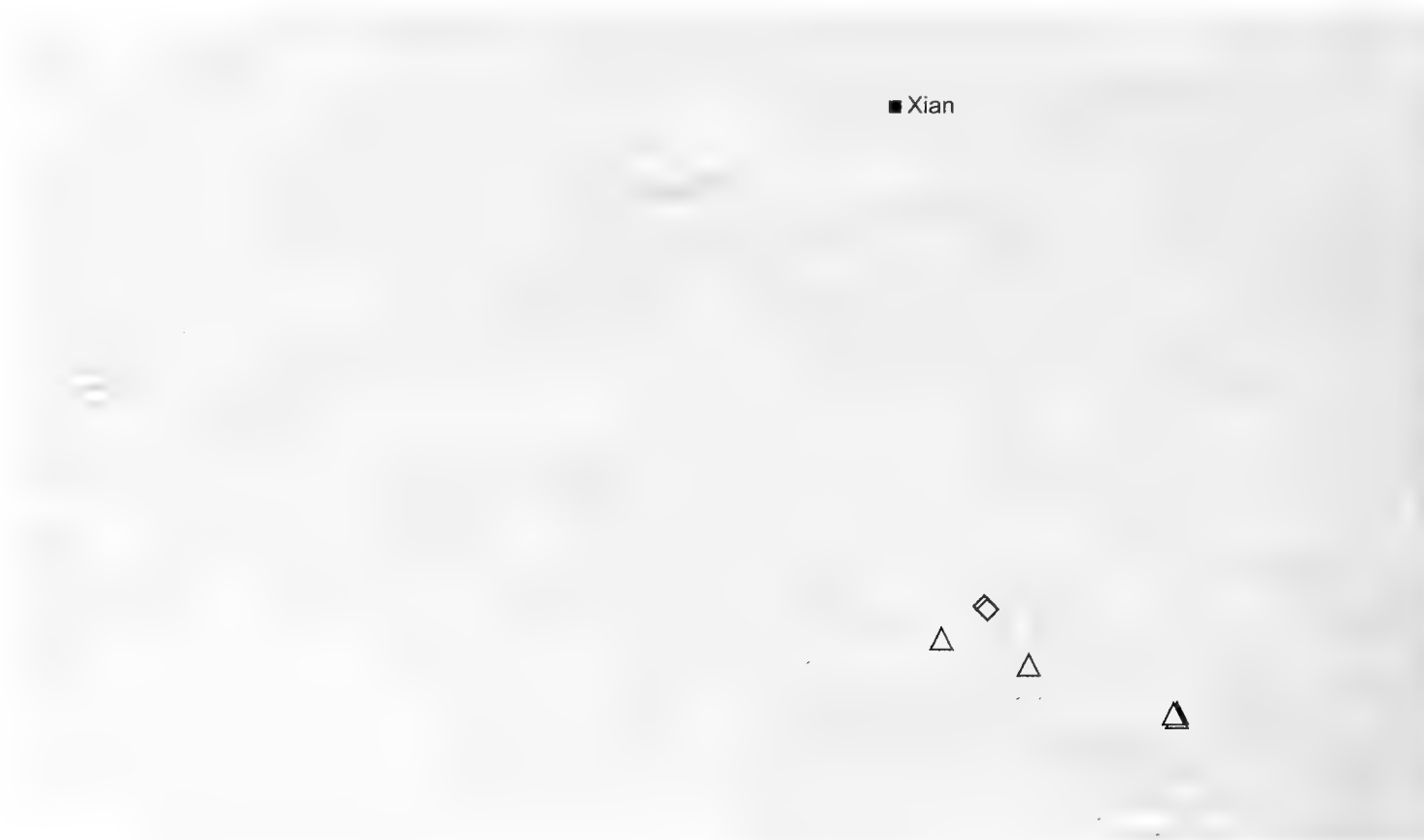
**Type material.** Holotype ♂: “CHINA: S-Shaanxi (Daba Shan), SE pass, 22 km NW Zhenping, 32°00'N, 109°21'E, 1930 m, 11.VII.2001, leg. M. Schülke [C01-10] / mixed deciduous forest (sifted) [C01-10] / Holotypus ♂ *Nazeris extensus* sp. n., det. V. Assing 2012” (cAss). Paratypes: 2♀: same data as holotype (cSch); 3♂, 2♀: “CHINA: S-Shaanxi (Daba Shan), creek valley SE pass, 20 km NW Zhenping, 31°59'N, 109°22'E, 1680 m, 11.VII.2001, leg. M. Schülke [C01-10A] / young mixed deciduous, small meadows, moss (sifted) [C01-10A]” (cSch, cAss); 2♀: “CHINA (S-Shaanxi) Daba Shan, creek valley SE pass, 20 km NW Zhenping, 1680 m, 31°59'N, 109°22'E (young mix. decid. for., leaves-sift.) 11.VII.2001 Wrase [10A]” (cSch, ZFMK).

**Etymology.** The specific epithet (Latin, adjective: stretched) refers to the long aedeagus.

**Description.** Body length 5.2–6.2 mm; length of forebody 2.7–3.0 mm. Habitus as in Fig. 77. Coloration: forebody brown to blackish; abdomen dark-brown to black; legs and antennae yellowish.

Head (Fig. 78) oblong, 1.05–1.10 times as long as broad; punctuation conspicuously coarse, moderately dense, and somewhat areolate; interstices without microsculpture; eyes of moderate size and distinctly convex, slightly less than 1/3 as long as the distance from posterior margin of eye to posterior constriction of head. Antenna approximately 1.5 mm long.

Pronotum (Fig. 78) 1.10–1.15 times as long as broad and approximately 0.95 times as broad as head; punctuation coarse, non-areolate and moderately dense; interstices narrower than diameter of punctures, glossy; surface in posterior median and lateral portions somewhat uneven, along



**Fig. 76.** Distributions of species of the *N. extensus* group: *N. extensus* (open diamonds); *N. angulatus* (open triangles).

midline narrowly impunctate and with additional oblique, somewhat elevated, and oblong lateral impunctate bands.

Elytra (Fig. 78) approximately 0.6 times as long as pronotum; humeral angles obsolete; punctation dense, moderately defined, and coarse; interstices glossy. Hind wings completely reduced.

Abdomen approximately 1.25 times as broad as elytra; punctation dense, defined, and moderately coarse on anterior, distinctly sparser and finer on posterior tergites; interstices without microsculpture and glossy; posterior margin of tergite VII without palisade fringe; posterior margin of tergite VIII weakly convex.

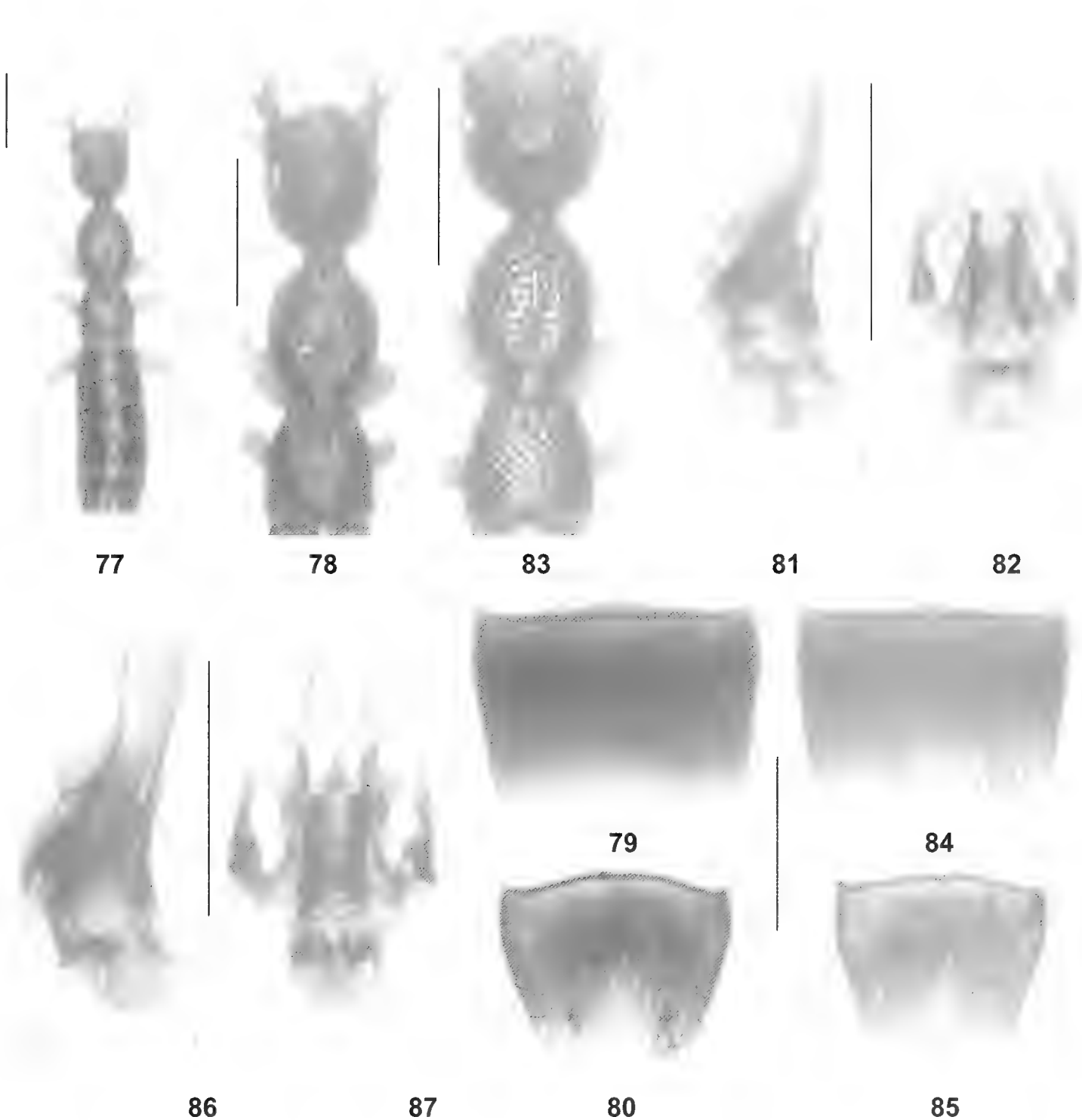
♂: sternite VI unmodified; sternite VII not distinctly modified (Fig. 79); sternite VIII with unmodified pubescence, posterior excision small, its depth only approximately 0.15 times the length of sternite (Fig. 80); aedeagus 0.9–1.0 mm long; dorso-lateral apophyses long, basally curved, apically straight in ventral view, and reaching apex of ventral process; ventral process apically of characteristic shape both in lateral and in ventral view (Figs 81–82).

**Comparative notes.** *Nazeris extensus* is distinguished from the syntopic or geographically close *N. parvincisus* and *N. bisinuosus* particularly by the coarser punctation of the head, the uneven and irregularly punctate posterior portion of the pronotum, the shape of the male sternite VIII, as well as by the longer and differently shaped aedeagus.

**Distribution and natural history.** The species was found in two adjacent localities in the Daba Shan, to the northwest of Zhenping, in southern Shaanxi (Fig. 76). The specimens were sifted from leaf litter and moss in mixed deciduous forests at altitudes of 1680 and 1930 m, partly together with *N. parvincisus*.

#### *Nazeris angulatus* sp. n. (Figs 76, 83–92)

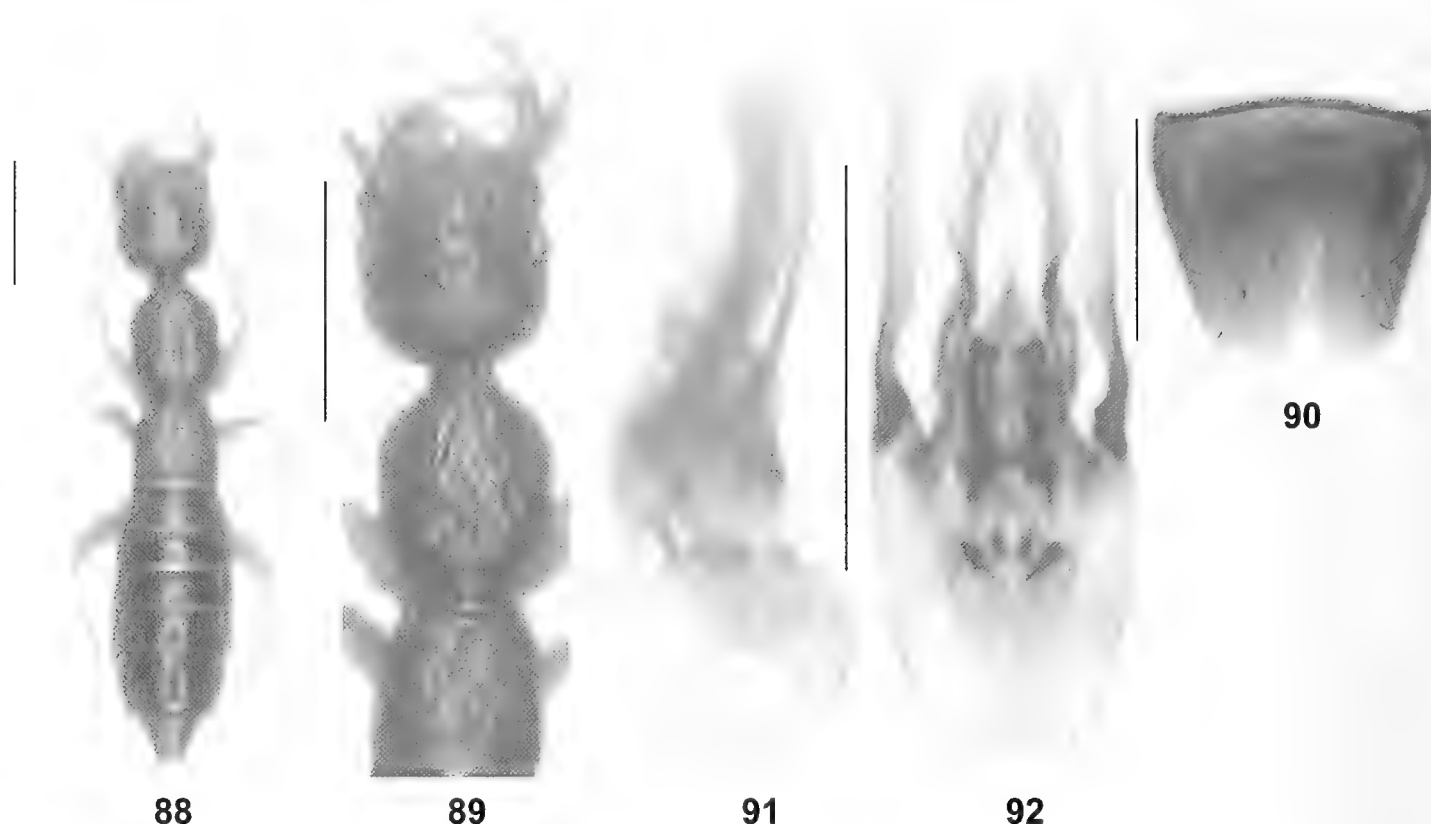
**Type material.** Holotype ♂: “CHINA: Border Shaanxi - Sichuan [now Chongqing] (Daba Shan), pass 20 km SSE Zhenping, 1700–1800 m, 31°44’N, 109°35’E, 12.VII.2001, leg. M. Schülke [C01-07C] / mixed forest, small creek valley, moss, bark (sifted) [C01-07C] / Holotypus ♂ *Nazeris angulatus* sp. n., det. V. Assing 2012” (cAss). Paratypes: 4♂, 3♀: same data as holotype (cSch, cAss, ZFMK); 2♂, 5♀: “CHINA: Border Shaanxi - Sichuan [now Chongqing] (Daba Shan), pass 20 km SSE Zhenping, 1700–1800 m, 31°44’N, 109°35’E, 9.VII.2001, leg. M. Schülke [C01-07] / young dry mixed forest, field edge, small creek valley, moss (sifted) [C01-07]” (cSch, cAss); 7♂, 9♀: “CHINA (border Shaanxi-Sichuan [now Chongqing]) Daba Shan, pass 20 km SSE Zhenping 1700–1800 m 31°44’N, 109°35’E (small creek vall., young mixed forest, leaf litt., moss) 9.&12.VII.2001 Wrase [07]” (cSch, cAss); 1♂, 1♀: “CHINA: W-Hubei (Daba Shan), creek valley 11 km NW Muyuping, 31°30’N, 110°22’E, 1960 m, 18.VII.2001, leg. M. Schülke [C01-17] / creek



**Figs 77–87.** *Nazeris extensus* (77–82) and *N. angulatus* (83–87). 77. Habitus. 78, 83. Forebody. 79, 84. Male sternite VII. 80, 85. Male sternite VIII. 81–82, 86–87. Aedeagus in lateral and in ventral view. Scale bars: 77–78, 83: 1.0 mm; 79–82, 84–87: 0.5 mm.

valley, mixed deciduous forest (sifted) [C01-17]” (cAss); 2♀: “CHINA: W-Hubei (Daba Shan), creek valley 8 km NW Muyuping, 31°29’N, 110°22’E, 1550–1650 m, 18.VII.2001, leg. M. Schülke [C01-16A] / creek valley, deciduous forest, moss (sifted) [C01-16A]” (cSch, cAss); 2♀: “CHINA: W-Hubei (Daba Shan), pass E of Mt. Da Shennongjia, 12 km NW Muyuping, 31°30’N, 110°21’E, 19.VII.2001, leg. M. Schülke [C01-13C] / creek valley, 1950–2050 m, mixed deciduous forest, moss, dead wood, mushrooms (sifted) [C01-13C]” (cSch); 1♀: “China (W-

Hubei) Daba Shan, pass E Mt. Da Shennongjia, 12 km NW Muyuping 31°30’N, 110°21’E 1950 m (dry creek vall., mix. decid. forest) 16.–22.VII.2001 Wrase [13]” (cSch); 1♂ [identified by J.-Y. Hu]: “China: Hubei Prov., Shennongjia N. R., Dajiuhu, 23-VIII-2004, LIN Jie leg.” (SNUC); 2♂, 2♀ [identified by J.-Y. Hu]: “China: Chongqing City / Chengkou Coun. / Dabashan / lower Huang’angou / N31.51.227 E109.07.174 / alt. 2030m / 22–23-IV-2008 / HUANG Hao & XU Wang leg.” (SNUC); 1♂: “CHINA: S-Shaanxi (Qinling Shan), pass



**Figs 88–92.** *Nazeris angulatus* from the environs of Muyuping. **88.** Habitus. **89.** Forebody. **90.** Male sternite VIII. **91–92.** Aedeagus in lateral and in ventral view. Scale bars: 88–89: 1.0 mm; 90–92: 0.5 mm.

on rd. Zhouzhi - Foping, 105 km SW Xi'an, N-slope, 1880 m, 33°44'N, 107°58'E, leg. M. Schülke [C01-03] / 4.VII.2001, shady rockwall base, moist (sifted) [C01-03]" (cAss).

**Comment.** The data for the paratypes deposited in the SNUC were communicated to me by J.-Y. Hu. His identification was confirmed based on photographs of the male primary and secondary sexual characters.

**Etymology.** The specific epithet (Latin, adjective) refers to the subbasally angled dorso-lateral apophyses of the aedeagus.

**Description.** Body length 4.5–5.8 mm; length of forebody 2.6–2.9 mm. External characters (Figs 83, 88–89), including coloration, as in *N. extensus*.

♂: sternite VI unmodified; sternite VII not distinctly modified (Fig. 84); sternite VIII with unmodified pubescence, posterior excision small, its depth approximately 0.15 times the length of sternite (Figs 85, 90); aedeagus 0.8–0.9 mm long; dorso-lateral apophyses long, subbasally with (usuasly) angular projection, and slightly projecting beyond apex of ventral process; ventral process apically of characteristic shape both in lateral and in ventral view (Figs 86–87, 91–92).

**Intraspecific variation.** The shape of the dorso-lateral apophyses is apparently subject to some intraspecific variation. In the male from the environs of Muyuping the dorso-lateral apophyses are subbasally not distinctly angled, but curved (Figs 91–92). The male sternite VIII (Fig. 90) and the external characters (Figs 88–89), however, are identical to those of material from other localities. Moreover, the locality to the northwest of Muyuping is situated between Chongqing and Da Shennongjia, where males with angular dorso-lateral apophyses were found, suggesting that the observed differences are an expression of intra- rather than interspecific variation.

**Comparative notes.** Based on the highly similar external and male secondary sexual characters, as well as on the similarly derived morphology of the aedeagus, *N. angulatus* is closely allied to *N. extensus*, from which it is distinguished by the longer and subbasally angularly produced dorso-lateral apophyses and the differently shaped ventral process of the aedeagus. It differs from the syntopic *N. compressus* by the completely different male sexual characters, as well as by external characters such as its larger size, the much coarser and less regular punctation of the forebody, and by the much more pronounced impunctate median band in the posterior half of the pronotum. From the syntopic *N. rectus*, it is separated by the paler coloration, smaller average size, coarser and areo-

late punctation of the head, sparser punctation of the posterior abdominal tergites, by the smaller posterior excision of the males sternite VIII, and by the completely different morphology of the aedeagus

**Distribution and natural history.** The known distribution ranges from the environs of Chongqing to Da Shennongjia in the western Daba Shan (Fig. 76). The label of one of the paratypes indicates that this specimen was collected in the Qinling Shan in southern Shaanxi. This specimen was almost certainly mislabelled. The same phenomenon was observed for a *Lathrobium* species with the same labels. The material from the Daba Shan was sifted from leaf litter and moss in mixed deciduous forests at altitudes between 1550 and 2050, together with *N. rectus*. The specimens were sifted from leaf litter and moss in a young mixed forests at altitudes of 1550–2050 m, together with *N. compressus* or *N. rectus*.

### The *Nazeris cultellatus* species group

#### *Nazeris cultellatus* sp. n. (Figs 50, 93–99)

**Type material.** Holotype ♂: “CHINA: S-Shaanxi (Qinling Shan), pass on rd. Zhouzhi-Foping, 105 km SW Xi'an, N-slope, 1700 m, 33°46'N, 107°58'E, leg. M. Schülke [C01-02] / 3.VII.2001, small creek valley, mixed deciduous forest, moss (sifted) [C01-02] / Holotypus ♂ *Nazeris cultellatus* sp. n., det. V. Assing 2012” (cAss). Paratypes: 1♀: same data as holotype (cSch, cAss); 1♂: “CHINA: S-Shaanxi (Qinling Shan), pass on rd. Zhouzhi-Foping, 105 km SW Xi'an, N-slope, 1990 m, 33°44'N, 107°59'E, leg. M. Schülke [C01-01] / 2./4.VII.2001, small creek valley, mixed deciduous forest, bamboo, small meadows, dead wood, mushrooms (sifted) [C01-01]” (cSch); 1♂: “China: Shaanxi, Qin Ling Shan, 107.56 E, 33.45 N, Autoroute km 93 S of Zhouzhi, 108 km SW Xi'an, Mountain Forrest [sic], sifted, 1650 m, 1.–2.09.1995, leg. M. Schülke” (cSch); 1♂: “China: Shaanxi, Qin Ling Shan, 110.06 E, 34.27 N, Hua Shan Mt., N Valley, 1200–1400 m, 118 km E Xian, sifted, 18.&20.08.1995, leg. M. Schülke” (cAss); 4♂, 6♀ [identified by J.-Y. Hu]: “China: Shaanxi Prov., Foping, alt. 1250–1400 m, 18-V-2004, Hu Jia-Yao, Tang Liang & Zhu Li-Long leg.” (SNUC); 6♂, 6♀ [identified by J.-Y. Hu]: “China: Shaanxi Prov., Zhouzhi Coun., Houzhenzi, N33.51.203 E107.50.183, alt. 1260 m, 5–10-V-2008, Huang Hao & Xu Wang leg.” (SNUC); 4♂, 3♀ [identified by J.-Y. Hu]: “China: Shaanxi Prov., Zhouzhi Coun., Houzhenzi, West Sangongli Gou, N33.50.613 E107.48.524, alt. 1336 m, 17–19-V-2008, Huang Hao & Xu Wang leg.” (SNUC); 9♂, 6♀ [identified by J.-Y. Hu]: “China: Shaanxi Prov., Ningshaan Coun., Huoditang Linchang, N33.26.060 E108.26.291, alt. 1724 m, 24–25-V-2008, Huang Hao & Xu Wang leg.” (SNUC); 33♂, 35♀ [identified by J.-Y.

Hu]: “China: Henan Prov., Xinyang City, Jigongshan, alt. 650–750 m, 5-VIII-2004, Hu, Tang & Zhu leg.” (SNUC); 3♂, 7♀ [identified by J.-Y. Hu]: “China: Henan Prov., Xinyang City, Jigongshan, alt. 250–650 m, 6-VIII-2004, Hu, Tang & Zhu leg.” (SNUC); 13♂, 14♀ [identified by J.-Y. Hu]: “China: Henan Prov., Nanyang City, Xixia Coun., Funiushan, alt. 1400–1700 m, 2-VIII-2004, Hu, Tang & Zhu leg.” (SNUC); 13♂, 8♀ [identified by J.-Y. Hu]: “China: Anhui Prov., Anqing City, Qianshan Coun., Tianzhushan, alt. 960 m, 23-IV-2005, Hu & Tang leg.” (SNUC); 7♂, 7♀ [identified by J.-Y. Hu]: “China: Anhui Prov., Anqing City, Qianshan Coun., Tianzhushan, alt. 1150–1250 m, 25-IV-2005 / Hu & Tang leg.” (SNUC); 5♂, 1♀ [identified by J.-Y. Hu]: “China: Anhui Prov., Anqing City, Qianshan Coun., Tianzhushan, 18–20-V-2007, Tang & He leg.” (SNUC).

**Comment.** The data for the paratypes deposited in the SNUC were communicated to me by J.-Y. Hu. His identification was confirmed based on photographs of the male primary and secondary sexual characters.

**Etymology.** The specific epithet (Latin, adjective: shaped like a knife) alludes to the laterally sharply compressed, somewhat knife-shaped ventral process of the aedeagus.

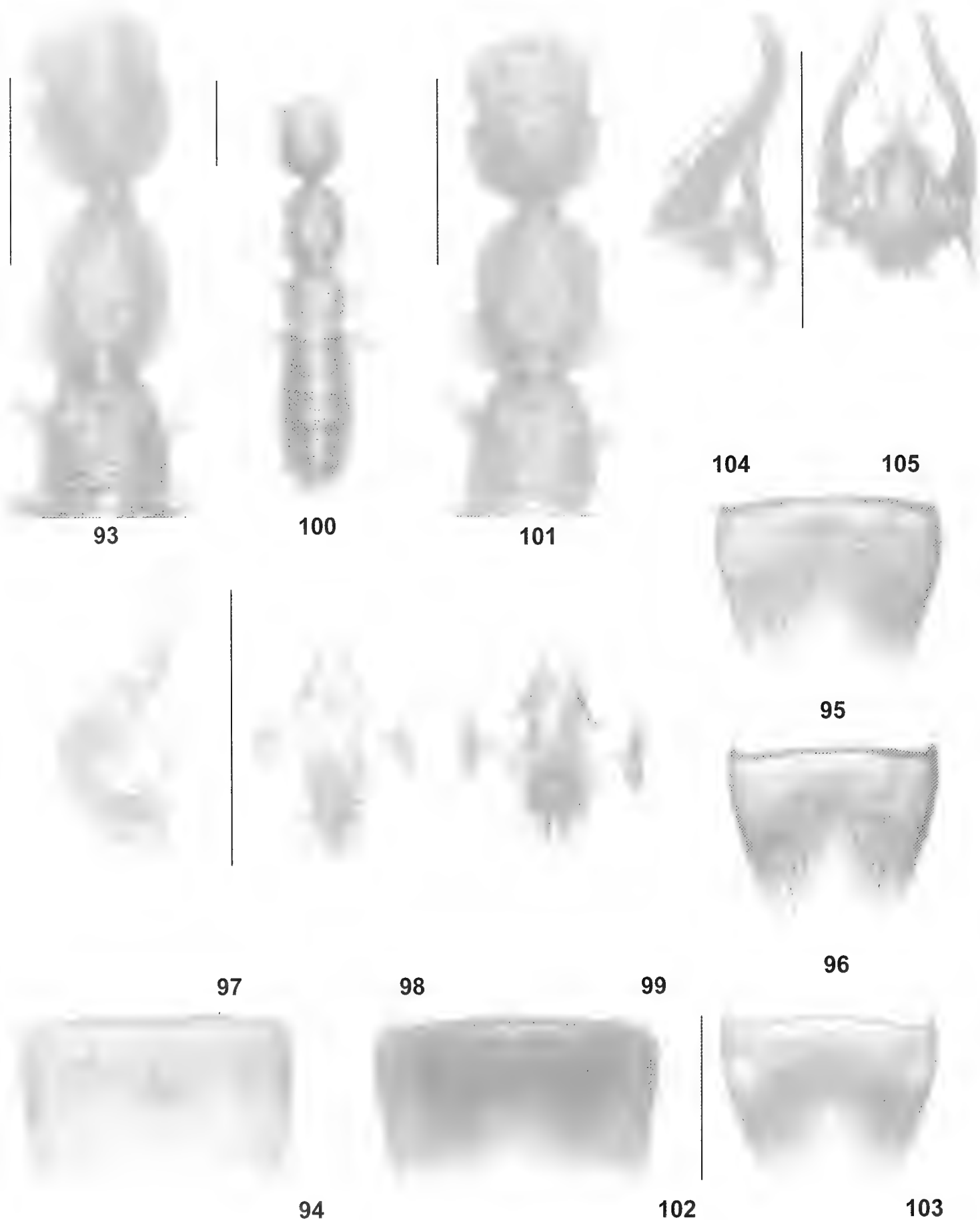
**Description.** Small species; body length 5.0–5.8 mm; length of forebody 2.6–2.8 mm. Coloration: body brown to dark-brown, abdomen sometimes somewhat darker than forebody, with reddish apex and paratergites; legs and antennae yellowish.

Head (Fig. 93) indistinctly oblong, approximately 1.02–1.05 times as long as broad, widest across eyes; punctation dense and not areolate; interstices without microsculpture, reduced to narrow ridges; eyes of moderate size and distinctly convex, at least slightly less than 1/3 as long as the distance from posterior margin of eye to posterior constriction of head. Antenna 1.4–1.5 mm long.

Pronotum (Fig. 93) 1.15–1.20 times as long as broad and approximately 0.85–0.90 times as broad as head; punctation non-areolate and dense, distinctly coarser than that of head; interstices reduced to narrow ridges, glossy; whole surface with regular punctation, without impunctate midline, or other impunctate or sparsely punctate patches.

Elytra (Fig. 93) short, approximately 0.55 times as long as pronotum; humeral angles obsolete; punctation dense, defined, and coarse; interstices glossy. Hind wings completely reduced.

Abdomen approximately 1.2 times as broad as elytra; punctation dense, defined, and relatively coarse on anterior tergites, somewhat finer on posterior tergites; interstices without microsculpture and glossy; posterior margin of tergite VII without palisade fringe; posterior margin of tergite VIII weakly convex.



**Figs 93–105.** *Nazeris cultellatus* (93–99; 96, 99. Male from Hua Shan) and *N. compressus* (100–105). 93, 101. Forebody. 94, 102. Male sternite VII. 95–96, 103. Male sternite VIII. 97–99, 104–105. Aedeagus in lateral and in ventral view. 100. Habitus. Scale bars: 93, 100–101: 1.0 mm; 94–99, 102–105: 0.5 mm.

♂: sternite VI unmodified; sternite VII with weakly convex posterior margin (Fig. 94); sternite VIII with unmodified pubescence, posterior excision moderately deep (Figs 95–96); aedeagus approximately 0.75 mm long; ventral process strongly compressed laterally, ventral surface very narrow; dorso-lateral apophyses moderately long, only slightly projecting beyond apex of ventral process (Figs 97–99).

**Comparative notes.** *Nazeris cultellatus* is readily distinguished from the syntopic *N. shaanxiensis* and *N. huanghaoi*, as well as from all other species distributed in the Qinling Shan by its smaller average size, the non-areolate punctuation of the head, the regular punctuation of the pronotum (impunctate midline or other impunctate patches absent), the shorter elytra, the shape of the posterior excision of the male sternite VII, and by the morphology of the smaller aedeagus (ventral process sharply compressed; shape of dorso-lateral apophyses). The highly similar external and male sexual characters suggest that *N. cultellatus* is most closely related to *N. nigrifulus* Hu et al., 2011 (two paratypes examined), which was described from the Longwang Shan in Zhejiang. It differs from *N. nigrifulus* by the paler coloration, the more slender head, the slightly less dense punctuation of the abdomen (visible especially on tergite VI), and the slightly different morphology of the aedeagus (apex of parameres extending slightly beyond apex of ventral process; ventral process somewhat less dilated, broadest closer to apex, and apically more deeply incised in ventral view). In *N. nigrifulus*, the parameres are slightly shorter (not quite reaching apex of ventral process), and the ventral process is more strongly dilated, broadest closer to base, and apically less deeply incised in ventral view. For illustrations of *N. nigrifulus* see Hu et al. (2011).

**Distribution and natural history.** Unlike the other species of the study region, *N. cultellatus* appears to be remarkably widespread (Fig. 50). The species was found in numerous localities in the Qinling Shan (Shaanxi), as well as in the Jigong Shan [31°49'N, 114°07'E], the Funiu Shan [33°42'N, 112°18'E], and the Tianzhu Shan [30°45'N, 116°27'E] in Henan and Anhui provinces. The specimens from the Qinling Shan were sifted from leaf litter and moss in mixed deciduous forests at altitudes of 1200–1990 m, partly together with *N. shaanxiensis* and *N. huanghaoi*; those from Henan and Anhui were partly found at lower altitudes (at least as low as 650 m).

*Nazeris compressus* sp. n. (Figs 50, 100–105)

**Type material.** Holotype ♂: “CHINA (border Shaanxi-Sichuan [now Chongqing]) Daba Shan, pass 20 km SSE Zhenping 1700–1800 m 31°44'N, 109°35'E (small creek

vall., young mixed forest, leaf litt., moss) 9.&12.VII.2001 Wrase [07] / Holotypus ♂ *Nazeris compressus* sp. n., det. V. Assing 2012” (cAss). Paratypes: 8♂, 4♀: same data as holotype (cSch, cAss); 3♂, 3♀: “CHINA: Border Shaanxi-Sichuan [now Chongqing] (Daba Shan), pass 20 km SSE Zhenping, 1700–1800 m, 31°44'N, 109°35'E, 9.VII.2001, leg. M. Schülke [C01-07] / young dry mixed forest, field edge, small creek valley, moss (sifted) [C01-07]” (cSch, cAss, ZFMK).

**Etymology.** The specific epithet (Latin, adjective) refers to the laterally strongly compressed ventral process of the aedeagus.

**Description.** Small species; body length 4.1–5.0 mm; length of forebody 2.3–2.6 mm. Habitus as in Fig. 100. Coloration: forebody reddish to dark-brown, often with paler elytra; abdomen dark-brown to blackish, with reddish apex and paratergites; legs and antennae yellowish.

Head (Fig. 101) indistinctly oblong or as long as broad, widest across eyes; punctuation dense and not areolate; interstices without microsculpture, forming narrow ridges; eyes of moderate size and distinctly convex, less than 1/3 as long as the distance from posterior margin of eye to posterior constriction of head. Antenna 1.4–1.5 mm long.

Pronotum (Fig. 101) short, approximately 1.1 times as long as broad and 0.9 times as broad as head; punctuation similar to that of head; midline with weakly pronounced impunctate band posteriorly.

Elytra (Fig. 101) short, approximately 0.6 times as long as pronotum; humeral angles obsolete; punctuation dense, defined, and coarse, similar to that of head and pronotum; interstices glossy. Hind wings completely reduced.

Abdomen approximately 1.20–1.25 times as broad as elytra; punctuation dense, defined, and relatively coarse on anterior tergites, somewhat finer on posterior tergites; interstices without microsculpture and glossy; posterior margin of tergite VII without palisade fringe; posterior margin of tergite VIII weakly convex.

♂: sternite VI unmodified; posterior margin of sternite VII weakly concave in the middle (Fig. 102); sternite VIII with unmodified pubescence, posterior excision small, its depth approximately 0.10–0.15 times the length of sternite (Fig. 103); aedeagus approximately 0.7 mm long; ventral process strongly compressed laterally; dorso-lateral apophyses distinctly projecting beyond apex of ventral process (Figs 104–105).

**Comparative notes.** Based on the similar external and male sexual characters, *N. compressus* is closely related to, probably the sister species of *N. cultellatus*, from which it is distinguished by the less oblong pronotum, the presence of a short and narrow median impunctate band in the posterior half of the pronotum, the similar punctuation of the head, pronotum, and elytra, and the morphology of the

aedeagus, particularly the distinctly longer dorso-lateral apophyses.

**Distribution and natural history.** The type locality is situated in the Daba Shan, to the south-southeast of Zhenping, at the border between Shaanxi and Chongqing (Fig. 50). The specimens were sifted from leaf litter and moss in a young mixed forest at an altitude of 1700–1800 m, together with *N. angulatus*.

## KEY TO SPECIES

1. Head with non-areolate punctation (e.g., Figs 93, 101). ..... 2
  - Head with areolate punctation (e.g., Figs 17, 23). . 6
2. Coloration of forebody reddish to dark-brown. Smaller species; length of forebody 2.3–2.8 mm. Pronotum either without impunctate median band posteriorly or with punctation similar to that of head. ♂: ventral process of aedeagus conspicuously laterally compressed. The *N. cultellatus* group. .... 3
  - Coloration of forebody blackish-brown to blackish. Larger species; length of forebody 2.5–3.2 mm. Pronotum with impunctate median band posteriorly; punctation coarser than that of head. ♂: ventral process of aedeagus not conspicuously laterally compressed. The *N. longilobatus* group (partim). ..... 4
3. Pronotum with very regular punctation, without impunctate median band posteriorly; punctation distinctly coarser than that of head (Fig. 93). Elytra very short, approximately 0.55 times as long as pronotum (Fig. 93). ♂: sternite VIII as in Figs 95–96; aedeagus shaped as in Figs 97–99; dorso-lateral apophyses not distinctly extending beyond apex of ventral process. Widespread, from Shaanxi to Anhui (Fig. 50). ..... ***N. cultellatus* sp. n.**
  - Pronotum with impunctate median band posteriorly; punctation not distinctly coarser than that of head (Fig. 101). Elytra slightly longer, approximately 0.6 times as long as pronotum (Fig. 101). ♂: sternite VIII as in Fig. 103; aedeagus shaped as in Figs 104–105; dorso-lateral apophyses distinctly extending beyond apex of ventral process. Daba Shan (Fig. 50). ..... ***N. compressus* sp. n.**
4. Abdominal tergites III–VI with conspicuously dense and coarser punctation, that of tergite VI not distinctly sparser than that of tergite IV. Pronotum more slender, approximately 1.15 times as long as broad and 0.8 times as broad as head. Punctation of pronotum and elytra conspicuously coarse, dense, and partly confluent (Fig. 33). ♂: posterior excision of sternite VI–II very small (Fig. 35); aedeagus stout, with short and broad ventral process, and with stout dorso-lateral apophyses (Figs 36–37). Daba Shan: Shaanxi (Fig. 2). The *N. parvincisus* group. .... ***N. parvincisus* sp. n.**
  - Abdomen with less coarse punctation, that of tergite VI finer and sparser than that of tergite IV. Pronotum less slender, 0.10–0.15 times as long as broad and 0.85–0.90 times as broad as head. Punctation of pronotum and elytra less coarse, less dense, and not confluent. ♂: posterior excision of sternite VIII much deeper; aedeagus slender, with long and slender ventral process, and with longer and more slender dorso-lateral apophyses. Daba Shan: Hubei. .... 5
5. Smaller species; length of forebody 2.5–2.8 mm. ♂: sternite VII with weakly concave posterior margin (Fig. 71); posterior excision of sternite VIII slightly broader and less deep (Fig. 72); aedeagus with more slender ventral process (ventral view) and with club-shaped dorso-lateral apophyses (Figs 73–75). Distribution: Fig. 50. .... ***N. clavatus* sp. n.**
  - Larger species; length of forebody 2.9–3.2 mm. ♂: sternite VII with small and shallow concavity posteriorly (Fig. 65); posterior excision of sternite VIII slightly narrower and deeper (Fig. 66); aedeagus with less slender ventral process (ventral view) and with straight, not club-shaped dorso-lateral apophyses (Figs 67–69). Distribution: Fig. 38. .... ***N. rectus* sp. n.**
6. ♂: aedeagus stout and compact, with short ventral process. Species distributed in the Qinling Shan and the Micang Shan. The *N. shaanxiensis* group. .... 7
  - ♂: aedeagus slender, with long and slender ventral process. .... 11
7. Forebody of uniformly blackish-brown to blackish coloration. ♂: posterior margin of sternite VII convexly produced in the middle (Fig. 24); posterior excision of sternite VIII rather deep and broadly V-shaped (Fig. 25); aedeagus with ventral process strongly dilated in the middle (ventral view); dorso-lateral apophyses apically obliquely truncate and with small tooth-like projection (Figs 27–31). S-Shaanxi/N-Sichuan: Micang Shan (Fig. 2). .... ***N. dilatatus* sp. n.**
  - Head and elytra often of paler coloration than pronotum. ♂: posterior margin of sternite VII truncate; posterior excision of sternite VIII less deep and usually narrower; aedeagus with ventral process not strongly dilated in the middle; dorso-lateral apophyses apically convex and without tooth-like projection. ... 8
8. ♂: aedeagus shaped as in Figs 4–5; apices of dorso-lateral apophyses slightly extending beyond apex of median lobe. Distribution more eastern: Zhouzhi and Ningshan counties (Fig. 2). .... ***N. shaanxiensis* Hu & Li**
  - ♂: aedeagus of different shape; apices of dorso-lateral apophyses not reaching beyond apex of median lobe. Western Qinling Shan and Micang Shan. .... 9

9. ♂: aedeagus shaped as in Figs 20–21. S-Shaanxi: Micanang Shan (Fig. 38). ..... *N. micangicus* sp. n.
- ♂: aedeagus of different shape. S-Gansu: Western Qinling Shan. .... 10
10. ♂: ventral process of aedeagus broader and shorter, its apex more acute both in lateral and in ventral view (Figs 12–14). Mountains to the southeast of Longnan (Fig. 2). ..... *N. sociabilis* sp. n.
- ♂: ventral process of aedeagus more slender and longer, its apex less acute (Figs 9–10). Region to the north of Chengxian (Fig. 2). .... *N. custoditus* sp. n.
11. Head with coarser punctation (e.g., Fig. 83). Pronotum with uneven surface, posteriorly usually with more or less distinct lateral elevations. Punctuation of abdominal tergites VI–VIII moderately dense to sparse, that of tergite VI distinctly sparser and finer than that of tergite IV. ♂: posterior excision relatively small and somewhat V-shaped; aedeagus with weakly sclerotized ventral process; dorso-lateral apophyses weakly sclerotized, subbasally distinctly curved, and nearly straight in apical 3/4–4/5. Daba Shan (Fig. 76). The *N. extensus* group. .... 12
- Head with less coarse punctation. Pronotum in most species with less uneven surface. Punctuation of abdominal tergite VI often not or only slightly finer and sparser than that of tergite IV. ♂: aedeagus more distinctly sclerotized; dorso-lateral apophyses of different shape. The *N. longilobatus* species group (partim). .... 13
12. ♂: dorso-lateral apophyses of aedeagus apically straight and subbasally usually angularly dilated (Figs 86–87, 91–92); sternite VIII as in Figs 85, 90. Western Daba Shan (Fig. 76). .... *N. angulatus* sp. n.
- ♂: dorso-lateral apophyses of aedeagus apically smoothly curved, without angular dilatation. Shaanxi (Fig. 76). .... *N. extensus* sp. n.
13. Larger species; length of forebody 2.9–3.2 mm. Elytra relatively longer, 0.65–0.70 times as long as pronotum (Fig. 40). Qinling Shan. .... 14
- Smaller species; length of forebody 2.5–2.8 mm. Elytra shorter, 0.60–0.65 times as long as pronotum (Figs 51, 56). Daba Shan. .... 15
14. Punctuation of abdomen conspicuously dense, even on tergites VI and VII (Figs 41–42). ♂: ventral process of aedeagus of characteristic shape; dorso-lateral apophyses distinctly curved in ventral view (Figs 45–46); posterior excision of sternite VIII less deep and broader (Fig. 44). Mountains to the southeast of Longnan (Gansu) (Fig. 38). ... *N. longilobatus* sp. n.
- Punctuation of abdomen less dense, particularly on tergites VI and VII. Ventral process of aedeagus of different shape (Figs 48–49), dorso-lateral apophyses almost straight; posterior excision of sternite VIII deeper and narrower (Fig. 47). Qinling Shan: environs of Taibai Shan (Shaanxi) (Fig. 38).  
..... *N. huanghaoi* Hu & Li
15. ♂: ventral process of aedeagus very slender and apically acute, both in lateral and in ventral view (Figs 54–55), dorso-lateral apophyses shorter and stouter; posterior excision of sternite VIII deeper and narrower (Fig. 52). Distribution: Fig. 50. ... *N. acutus* sp. n.
- ♂: ventral process of aedeagus less slender and with dorsal extension (lateral view), dorso-lateral apophyses longer, more slender, and bisinuate (Figs 59–62); posterior excision of sternite VIII slightly broader and less deep (Fig. 58). Distribution: Fig. 38.  
..... *N. bisinuosus* sp. n.

## CHECKLIST OF THE NAZERIS SPECIES OF MAINLAND CHINA AND TAIWAN

Species	Distribution
<i>acutus</i> sp. n. Shaanxi: Daba Shan	
<i>aestivalis</i> Ito, 1995	Taiwan
<i>affinis</i> Ito, 1996	Taiwan
<i>alishanus</i> Ito, 1985	Taiwan
<i>alpinus</i> Watanabe & Xiao, 1997	Yunnan: Yulongxue Shan
<i>angulatus</i> sp. n.	Shaanxi/Chongqing/Hubei: Daba Shan
<i>anhuiensis</i> (J. Li, 1993)	Anhui
<i>baihuanensis</i> Watanabe & Xiao, 2000	Yunnan: Gaoligong Shan: Baoshan
<i>baishanzuensis</i> Hu, Li & Zhao, 2011	Zhejiang: Baishanzu
<i>bicornis</i> Hu, Li & Zhao, 2007	Sichuan: Gongga Shan
<i>bisinuosus</i> sp. n.	Shaanxi: Daba Shan
<i>brunneus</i> Hu, Zhao & Zhong, 2006	Jiangxi: Wuyi Shan
<i>canaliculatus</i> Zheng, 1992	Sichuan: Wolong
<i>caoi</i> Hu, Li & Zhao, 2011	Yunnan: Nabanhe Nature Reserve
<i>centralis</i> Ito, 1996	Taiwan
<i>chinensis</i> Koch, 1939	Zhejiang: Tianmu Shan
<i>clavatus</i> sp. n.	Hubei: Daba Shan
<i>compressus</i> sp. n.	Shaanxi/Chongqing: Daba Shan
<i>cultellatus</i> sp. n.	Shaanxi: Qinling Shan; Henan; Anhui
<i>custoditus</i> sp. n.	Gansu: western Qinling Shan
<i>daliensis</i> Watanabe & Xiao, 1997	Yunnan: Diangcang Shan, Laohu Shan
<i>dayaoensis</i> Hu & Li, 2012	Guangxi: Dayao Shan

**Checklist of the Nazeris species of mainland China and Taiwan (continued).**

Species	Distribution
<i>dilatatus</i> sp. n.	Shaanxi/Sichuan: Micang Shan
<i>extensus</i> sp. n.	Shaanxi: Daba Shan
<i>femoralis</i> Ito, 1985	Taiwan
<i>foliaceus</i> Zheng, 1992	Sichuan: Wolong
<i>formosanus</i> Ito, 1996	Taiwan
<i>fujianensis</i> Hu, Li & Zhao, 2010	Fujian: Meihua Shan Nature Reserve
<i>furcatus</i> Hu, Li & Zhao, 2011	Zhejiang: Wuyanling
<i>giganteus</i> Watanabe & Xiao, 1997	Yunnan: Diangcang Shan, Laohu Shan
<i>grandis</i> Hu & Li, 2012	Guangxi: Dayao Shan
<i>guizhouensis</i> Hu et al., 2005	Guizhou: Fanjing Shan
<i>hailuogouensis</i> Hu, Li & Zhao, 2007	Sichuan: Gongga Shan
<i>huanghaoi</i> Hu & Li, 2010	Shaanxi: Qinling Shan: Taibai Shan
<i>huanxipoensis</i> Watanabe & Xiao, 2000	Yunnan: Tengchong env.
<i>imitator</i> Ito, 1996	Taiwan
<i>ishiiianus</i> Watanabe & Xiao, 2000	Yunnan: Gaoligong Shan: Baoshan
<i>jiulongshanus</i> Hu, Li & Zhao, 2011	Zhejiang: Jiulong Shan
<i>jizushanensis</i> Watanabe & Xiao, 1997	Yunnan: Jizu Shan
<i>lijinweni</i> Hu, Li & Zhao, 2011	Zhejiang: Fengyang Shan
<i>lingulatus</i> Hu & Li, 2009	Anhui: Guniujiang Shan
<i>longilobatus</i> sp. n.	Gansu: western Qinling Shan
<i>luoi</i> Hu & Li, 2012	Guangxi: Dayao Shan
<i>magnus</i> Hu, Li & Zhao, 2007	Sichuan: Erlang Shan
<i>matsudai</i> Ito, 1985	Taiwan
<i>megalobus</i> Hu & Li, 2012	Guangxi: Dayao Shan
<i>micangicus</i> sp. n.	Shaanxi: Micang Shan
<i>minor</i> Koch, 1939	Zhejiang: Tianmu Shan
<i>monticola</i> Ito, 1996	Taiwan
<i>motuensis</i> Hu, Li & Zhao, 2008	Xizang: Aniqiao
<i>nabanhensis</i> Hu, Li & Zhao, 2011	Yunnan: Nabanhe Nature Reserve
<i>nigritulus</i> Hu, Li & Zhao, 2011	Zhejiang: Longwang Shan
<i>niutoushanus</i> Hu, Li & Zhao, 2011	Zhejiang: Nioutou Shan
<i>nomurai</i> Watanabe & Xiao, 2000	Yunnan: Gaoligong Shan: Baoshan
<i>parabrunneus</i> Hu, Li & Zhao, 2011	Zhejiang: Jiulong Shan
<i>parvincisus</i> sp. n.	Shaanxi/Chongqing: Daba Shan
<i>persimilis</i> Ito, 1995	Taiwan
<i>qingchengensis</i> Zheng, 1992	Sichuan: Qingcheng Shan
<i>qini</i> Hu & Li, 2012	Guangxi: Dayao Shan
<i>rectus</i> sp. n.	Hubei: Daba Shan
<i>robustus</i> Ito, 1995	Taiwan
<i>rougemonti</i> Ito, 1996	Zhejiang: Tianmu Shan
<i>ruani</i> Hu, Li & Zhao, 2007	Sichuan: Labahe
<i>sadanarii</i> Hu & Li, 2010	
= <i>hisamatsui</i> Hu & Li, 2009	Anhui: Guniujiang Shan
<i>shaanxiensis</i> Hu & Li, 2010	Shaanxi: Qinling Shan
<i>shenshanjiai</i> Hu, Li & Zhao, 2011	Zhejiang: Fengyang Shan
<i>silvestris</i> Ito, 1996	Taiwan
<i>simulans</i> Ito, 1996	Taiwan
<i>smetanai</i> Ito, 1996	Taiwan
<i>sociabilis</i> sp. n.	Gansu: western Qinling Shan
<i>taiwanus hohuanus</i> Ito, 1985	Taiwan
<i>taiwanus taiwanus</i> Ito, 1985	Taiwan
<i>tangi</i> Hu, Li & Zhao, 2008	Xizang: Dongjiu
<i>tani</i> Hu & Li, 2012	Guangxi: Dayao Shan
<i>tianmuensis</i> Hu, Li & Zhao, 2011	Zhejiang: Tianmu Shan
<i>trifolius</i> Ito, 1996	Taiwan
<i>truncatus</i> Zheng, 1992	Sichuan: Emei Shan
<i>uenoi</i> Ito, 1995	Taiwan
<i>vernalis</i> Ito, 1995	Taiwan
<i>wuyiensis</i> Hu, Zhao & Zhong, 2006	Jiangxi: Wuyi Shan
<i>xuwangi</i> Hu, Li & Zhao, 2010	Fujian: Meihuashan Nature Reserve
<i>yandangensis</i> Hu, Li & Zhao, 2011	Zhejiang: Yandang Shan
<i>yanyingae</i> Hu, Li & Zhao, 2011	Zhejiang: Baishanzu
<i>yasutoshii</i> Ito, 1996	Taiwan
<i>zhang</i> Watanabe & Xiao, 1993	Yunnan: Yuan Shan near Kunming
<i>zhujingwenae</i> Hu, Li & Zhao, 2011	Zhejiang: Siming Shan

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# On the *Lathrobium* fauna of China I. The fauna of the Qinling Shan, the Daba Shan, and adjacent regions (Coleoptera: Staphylinidae: Paederinae)

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**Abstract.** Types and additional material of the paederine genus *Lathrobium* Gravenhorst, 1802 from the Qinling Shan, the Daba Shan, and adjacent mountain ranges in Central China (Gansu, Shaanxi, northern Sichuan, western Hubei) are revised. In all, 34 species are recognized, 29 of which are described and illustrated for the first time: *L. aquilinum* sp. n. (Shaanxi: Daba Shan); *L. biapicale* sp. n. (Sichuan: Songpan env.); *L. bifidum* sp. n. (Hubei: Daba Shan); *L. biforme* sp. n. (Gansu: Qinling Shan); *L. brevilobatum* sp. n. (Shaanxi: Qinling Shan); *L. brevisternale* sp. n. (Sichuan: Min Shan); *L. brevitergale* sp. n. (Shaanxi: Qinling Shan); *L. concameratum* sp. n. (Shaanxi: Qinling Shan); *L. crassispinosum* sp. n. (Shaanxi/Sichuan: Micang Shan); *L. curvispinosum* sp. n. (Hubei: Daba Shan); *L. declive* sp. n. (Shaanxi: Qinling Shan); *L. detruncatum* sp. n. (Sichuan: Songpan env.); *L. effeminatum* sp. n. (Shaanxi: Qinling Shan); *L. falcatum* sp. n. (Gansu: Qinling Shan); *L. fissispinosum* sp. n. (Hubei: Daba Shan); *L. gansuense* sp. n. (Gansu: Qinling Shan); *L. huaense* sp. n. (Shaanxi: Qinling Shan); *L. inflexum* sp. n. (Gansu: mountains SE Longnan); *L. lentum* sp. n. (Sichuan: Songpan env.); *L. longispinosum* sp. n. (Shaanxi/Sichuan: Micang Shan); *L. lunatum* sp. n. (Gansu: Qinling Shan); *L. minicum* sp. n. (Gansu: Min Shan); *L. rectispinosum* sp. n. (Shaanxi: Daba Shan); *L. serrilobatum* sp. n. (Shaanxi/Sichuan: Micang Shan); *L. sociabile* sp. n. (Shaanxi: Qinling Shan); *L. spinigerum* sp. n. (Shaanxi: Micang Shan); *L. tectifforme* sp. n. (Shaanxi: Qinling Shan); *L. trifidum* sp. n. (Shaanxi/Chongqing: Daba Shan); *L. varisternale* sp. n. (Shaanxi: Qinling Shan). A lectotype is designated for *Lathrobium chinense* Bernhauer, 1938. Aside from one widespread macropterous species and one wing-dimorphic species distributed from Gansu to Jiangsu, all the species of the study region are locally endemic and micropterous. The distributions are mapped. The endemic micropterous and wing-dimorphic species are attributed to seven species groups. Several species are subject to more or less pronounced sexual size dimorphisms (males larger than females). The locally endemic species were collected primarily by sifting leaf litter, moss, and grass roots in forest and shrub habitats at altitudes of 1000–4080 m. The material of most species is represented partly by teneral adults found in July and August, suggesting pre-imaginal development in spring and early summer. A key to the species of the study region and a checklist of the *Lathrobium* species recorded from China and Taiwan are provided. Five species previously reported from China are excluded from the Chinese *Lathrobium* fauna; these records are most likely based on misidentifications. One widespread East Palaearctic species is recorded from China for the first time. The genus is now represented in mainland China by 89 and in Taiwan by 13 species.

**Key words.** Taxonomy, rove beetles, *Lathrobium*, Central China, Qinling Shan, Daba Shan, new species, lectotype designation, sexual size dimorphism, wing dimorphism, checklist, distribution maps, key to species.

## INTRODUCTION

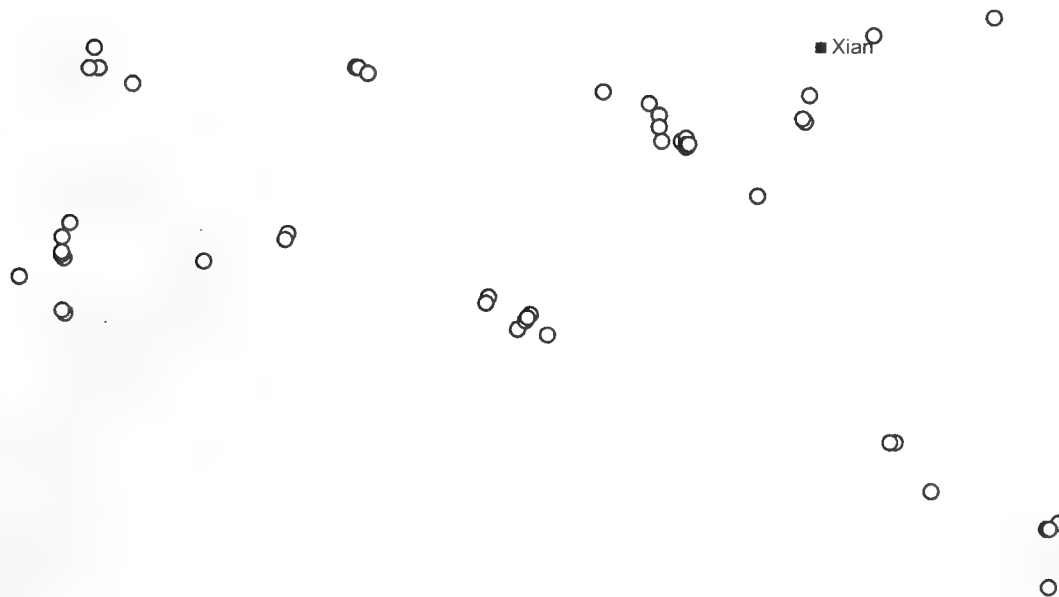
The Holarctic genus *Lathrobium* Gravenhorst, 1802 is currently represented in the Palaearctic region by approximately 380 species in two subgenera (Assing 2012; Smetana 2004; Schülke unpubl.). The West Palaearctic *Lathrobium* fauna can be considered rather well-studied. Rare discoveries of undescribed species in recent years are confined to regions such as Turkey, Iran, and Middle Asia. The inventory of the East Palaearctic fauna, on the other hand, is far from complete, as is evidenced not only by the number of recent and on-going species descriptions particularly from China (e.g., Peng et al. 2012a–e). Two-thirds of the 48 species recognized in a recent revision of the Himalayan fauna were newly described (Assing 2012).

According to a checklist provided by Peng et al. (2012a), 49 extant species of *Lathrobium* were previously report-

ed from mainland China; the records of four species were regarded as doubtful. In the meantime, 15 additional species have been described (Peng et al. 2012b–e, 2013), thus raising the total number of species known from mainland China to 64. According to a recent revision, the genus is represented in Taiwan by thirteen locally endemic species (Assing 2010). In mainland China, *Lathrobium* is undoubtedly represented by more micropterous and locally endemic species than any other paederine genus. This conclusion is based not only on the number of described taxa, but also on personal observations both in the field and on material seen in various public and private collections. With a total of 66 described species recorded from mainland China, all of them micropterous and locally endemic, *Nazeris* Fauvel, 1873 is enormously diverse, too,



**Fig. 1.** Geographic position of the study region in China. The frame marks the outline of the distribution maps provided below.



**Fig. 2.** Sample localities in the study region (all *Lathrobium* records pooled).

but this genus has received more attention in the past (Assing 2013). In the region covered in the present study, *Nazeris* is represented by only approximately half as many species as *Lathrobium*.

Unlike the Himalayan fauna, which had been addressed by European authors such as Coiffait, the *Lathrobium* species of China had received little attention until very recently. Only two of the locally endemic species had been described prior to 1990. Based on the remarkable number of recently described species from various mountain ranges in China, on the results of the present study, and on the material from other regions seen in various collections (to be treated in future studies), the true diversity of *Lathrobium* in mainland China can be expected to comprise several hundred species.

The Qinling Shan is a geologically old mountain range in central China with an east-west extension of approximately 650 km from southern Gansu in the east to Henan in the west. The highest peak of the Qinling Shan is the Taibai Shan at 3,767 m. The Qinling Shan forms the main dividing line between the temperate north and the south of China, which is strongly influenced by subtropical monsoon rains. According to Rost (1993), the mountain range was partly glaciated at least in the late Pleistocene. Data on the geology, geography, and climate were compiled by Ratschbacher et al. (2003) and Rost (1993). Adjacent to the Qinling Shan is the Daba Shan, which extends along the border between Shaanxi and Sichuan eastwards into western Hubei and which is known to represent a glacial refuge. The Shennongjia massif forms the easternmost part of the range and has the highest peaks, with six peaks ranging in altitude from 3,000 to 3,105 m. For a map illustrating the geographic position of both the Qinling Shan and the Daba Shan see Assing (2013) and Fig. 1. Only three micropterous species were previously known from the Qinling Shan (Chen et al. 2005; Peng et al. 2013), none from the Daba Shan.

The present paper is based on material collected during a joint field trip to southern Shaanxi, southern Gansu, and northern Sichuan conducted by Michael Schülke, David Wrase (both Berlin), and the author in summer 2012, on material collected by Andreas Pütz, Michael Schülke, Aleš Smetana, and David Wrase during several earlier field trips to the Qinling Shan and the Daba Shan, as well as on additional material located in some museum collections.

## MATERIAL AND METHODS

The morphological studies were conducted using a Steini SV 11 microscope (Zeiss Germany) and a Jenalab compound microscope (Carl Zeiss Jena). A digital camera (Nikon Coolpix 995) was used for the photographs. The maps were created using MapCreator 2.0 (primap) soft-

ware. The localities where *Lathrobium* material was collected are mapped in Fig. 2.

Body length was measured from the anterior margin of the mandibles (in resting position) to the abdominal apex, the length of the forebody from the anterior margin of the mandibles to the posterior margin of the elytra, head length from the anterior margin of the frons to the posterior margin of the head, elytral length at the suture from the apex of the scutellum to the posterior margin of the elytra, and the length of the aedeagus from the apex of the ventral process to the base of the aedeagal capsule. The “parameral” side (i.e., the side where the sperm duct enters) is referred to as the ventral, the opposite side as the dorsal aspect.

## COLLECTION MATERIAL DEPOSITORIES

FMNH	Field Museum of Natural History, Chicago (via L. H. Herman)
MHNG	Muséum d'Histoire Naturelle, Genève (G. Cuccodoro)
MNHUB	Museum für Naturkunde der Humboldt-Universität Berlin (J. Frisch)
NHMB	Naturhistorisches Museum Basel (M. Geiser, I. Zürcher)
NHMW	Naturhistorisches Museum Wien (H. Schillhammer)
SNUC	Insect Collection of Shanghai Normal University, Shanghai
ZFMK	Zoologisches Forschungsmuseum Alexander Koenig, Bonn
cAss	author's private collection
cPüt	priv. collection Andreas Pütz, Eisenhüttenstadt
cSch	priv. collection Michael Schülke, Berlin
cSme	priv. collection Aleš Smetana, Ottawa

## RESULTS

### Diversity and distribution

Including the 29 newly described taxa, the *Lathrobium* fauna of the study region is represented by as many as 34 named species. The true diversity, however, is probably significantly greater. Females representing several undescribed species were examined, a considerable number of the newly described taxa are known only from their respective type localities, and many regions of the Daba Shan, the Qinling Shan, and adjacent mountain ranges have not been studied thoroughly. Except for two species, *L. dignum* (widespread in the East Palaearctic) and *L. sinense* (widespread from Gansu to Jiangsu), all the species are locally endemic.

## Natural history

The apterous species were almost exclusively found in leaf litter, moss, and grass roots of various forest biotopes, beneath shrubs, and in subalpine habitats at altitudes of 1070–4080 m. The widespread and macropterous *L. dignum* was collected both at low (400 m) and at high elevations of nearly 3,000 m. The wing-dimorphic *L. sinense* appears to inhabit a wide range of habitats (moist habitats with *Artemisia* and other herbs, banks of streams, shrub and forest biotopes) at a wide range of altitudes (600–2940 m). On numerous occasions, two or more *Lathrobium* species, often belonging to the same species group, were collected together in the same locality. It is unclear how they are ecologically segregated.

The examined material of the majority of species included teneral adults collected in July and August, suggesting that mating and pre-imaginal development occur in spring and early summer.

Remarkably, a considerable number of species, particularly those of the *L. varisternale* group (see below), are subject to a more or less pronounced sexual size dimorphism, with the males on average slightly or distinctly larger than the females. An explanation of how selection may have favoured such a dimorphism is unknown.

## Species groups

The micropterous *Lathrobium* species described from the East Palearctic region, including some of those recorded from mainland China, have mainly been attributed to species groups such as the *L. pollens* and *L. brachypterum*, and *L. harimanum* groups. *Lathrobium pollens* Sharp, 1889, *L. brachypterum* Sharp, 1889, and *L. harimanum* Watanabe, 1986 are probably locally endemic to certain regions in Japan; *L. pollens* was also reported from China, but this record is likely to be based on a misidentification (see also the checklist at the end of this paper). According to Watanabe (1991a, b, 1997), the representatives of the *L. pollens* group are characterized by “vestigial eyes and degenerated hind wings like the members of the group of *L. harimanum*, but can be distinguished from the latter by the darker colour of body and distinctly transverse head and elytra” (Watanabe 1991a), whereas the species of the *L. harimanum* group are distinguished from those of the *L. pollens* group by “the lighter colour of body, not transverse head, and long elytra” (Watanabe 1991b), and the “members of the *L. brachypterum* group are characterized by the body smaller in size than in the *Lathrobium* (s. str.) *pollens* group (Watanabe 1997). The limitations of this concept are evident, not only because it is based exclusively on typological principles, but also because it neglects numerous phylogenetically significant characters. Thus, it is not surprising that, in a paper con-

taining the descriptions of seven new species from Yunnan, Watanabe & Xiao (1997) attribute “four of the seven [...] to the group of *Lathrobium* (s. str.) *pollens/brachypterum*” and the remaining three species to no group at all.

The endemic *Lathrobium* fauna of the study region is evidently represented by several distinct lineages, most of which are characterized particularly by the male and female sexual characters. In general, closely related species, particularly hypothesized adelphotaxa, are at the same time geographically close, suggesting that the separation of gene pools and ensuing speciation was – at least primarily – initiated by local geological and climatic events. There appear to be no closer phylogenetic affiliations between the *Lathrobium* fauna of the Qinling Shan and that of the Daba Shan. Except for the wing-dimorphic and more widespread sole representative of the *L. sinense* group, the species groups are confined to either the Qinling Shan (including the adjacent mountain ranges extending westwards into northern Sichuan) or the Daba Shan (including the Micang Shan).

The *L. sinense* group includes only one species, *L. sinense*, and is characterized above all by the highly derived morphology of the aedeagus, i.e., the conspicuous large sclerotized internal structure with a long and spine-like apical extension, and the short, stout, straight, and in ventral view weakly asymmetric ventral process (Figs 9–13). Additional diagnostic characters are the relatively small body size without sexual size dimorphism (length of forebody 2.6–3.0 mm), the weakly modified male sternite VII (Fig. 7), the shape and chaetotaxy of the male sternite VIII (symmetric, pubescence weakly modified, posterior excision relatively deep and V-shaped) (Fig. 8), and the anteriorly broadly undivided female tergite IX (Figs 16–17). Unlike the locally endemic species known from the study region, *L. sinense* is wing-dimorphic (Figs 3–6) and widespread (Fig. 18).

The *L. lentum* group, too, is represented only by a single species, *L. lentum*. It differs from all other species (groups) of the study region by the complete absence of microsculpture on the head (Fig. 163), by the conspicuously short tarsi, and by the general morphology of the aedeagus, particularly of the ventral process of the aedeagus (Figs 166–167). Additional diagnostic characters are the broad body, the relatively short pronotum (only approximately 1.2 times as long as broad), the chaetotaxy of the male sternite VII (with two extensive clusters of dense modified setae; Fig. 164), the weakly modified male sternite VIII (symmetric, narrowly without pubescence along the middle, broad and shallow posterior excision; Fig. 165), the posteriorly weakly produced female sternite VIII (only approximately as long as broad; Fig. 168), the completely divided female tergite IX, and the weakly pronounced sexual size dimorphism.

The *L. fissispinosum* group is constituted by a bi- or trilobed ventral process of the aedeagus, an evident synapomorphy (e.g., Figs 174–175, 180–181, 229–239), and additionally characterized by a more or less strongly modified (e.g., Figs 173, 179), sometimes asymmetric male sternite VIII (e.g., Fig. 192) and by the morphology the female tergite IX (anteriorly much shorter than tergite X, either undivided, with median suture, or completely divided; e.g., Figs 189, 197). The group comprises nine species (*L. fissispinosum*, *L. rectispinosum*, *L. curvispinosum*, *L. longispinosum*, *L. crassispinosum*, *L. spinigerum*, *L. trifidum*, *L. bifidum*, *L. serrilobatum*) distributed in the Daba Shan (including the Micang Shan). Within this group, six species (*L. fissispinosum*, *L. rectispinosum*, *L. curvispinosum*, *L. longispinosum*, *L. crassispinosum*, *L. spinigerum*) share a conspicuous synapomorphy, the presence of a remarkably long spine in the internal sac of the aedeagus (e.g., Figs 174–175, 180–181). Among the remaining three species, which lack the internal spine of the aedeagus, *L. trifidum* and *L. bifidum* apparently represent adelphotaxa, as can be inferred from the similarly derived morphology of the ventral process of the aedeagus and the similarly derived morphology of the female tergite IX (completely divided in the middle). The third species, *L. serrilobatum*, shares one synapomorphy, the small basal portion of the aedeagus, with *L. fissispinosum* and the five other species with a long spine in the internal sac of the aedeagus. Interestingly, the morphology of the female tergite IX is subject to pronounced variation in the *L. fissispinosum* group. Some species have this tergite completely divided (e.g., Figs 205, 212), in others it is undivided (e.g., Figs 189, 197), though always shorter in the middle than tergite X. These extremes are linked by transitional conditions: in some species the female tergite IX is not completely separated, but has a short suture in the middle.

The pronounced interspecific variation of sexual characters, to some extent also of external characters, suggests that speciation in the *L. fissispinosum* group occurred in the more distant geological past.

The *L. effeminatum* group is represented only by a single species, *L. effeminatum* from the Qinling Shan, which is characterized particularly by the shape and chaetotaxy of the male sternite VIII (symmetric, weakly oblong, posterior margin convex and without median excision, practically unmodified pubescence; Fig. 74), the absence of a sexual dimorphism of the protarsi, and additionally by small body size, relatively sparse punctation of the abdomen, the absence of a sexual dimorphism of tergite VIII, an unmodified male sternite VII (Fig. 73), an aedeagus with a small basal portion and with a long, slender, and distinctly asymmetric ventral process (Figs 75–76), and by the morphology of the female tergite IX (anterior median portion undivided and distinctly shorter than tergite X).

The *L. gansuense* group comprises seven species distributed in northern Sichuan and the Qinling Shan: *L. gansuense*, *L. shaanxiense*, *L. declive*, *L. heteromorphum*, *L. biapicale*, *L. detruncatum*, and *L. brevisternale*. This group is constituted particularly by the presence of a small spine in the internal sac of the aedeagus (e.g., Figs 24, 32), and additionally by small to moderate body size, an oblong head (e.g., Figs 19, 27), blackish eyes with weakly defined ommatidia, mostly dense punctation of the whole abdomen, a weakly pronounced sexual dimorphism of the protarsi, the absence of sexual dimorphisms of body size (exception: *L. biapicale* with a weakly pronounced dimorphism) and of the shape of the posterior margin of tergite VIII, a weakly asymmetric male sternite VII (e.g., Figs 20, 28), a distinctly asymmetric male sternite VIII (with a characteristic pattern of modified setae and with the posterior excision moved to the left; e.g., Figs 21, 29), a strongly asymmetric and apically acute or bilobed ventral process (e.g., Figs 22–23, 30–31), and by the short posterior processes of the anteriorly broadly undivided female tergite IX (e.g., Fig. 26). The similar morphology of the aedeagus, as well as the similarly derived shape and chaetotaxy of the male sternite VIII suggest that *L. gansuense* and *L. shaanxiense* are adelphotaxa; the same is true of *L. detruncatum* and *L. brevisternale*. The species of this group were primarily found at higher elevations (only on one occasion below 2000 m, other records between 2270 and 4080 m).

The *L. aquilinum* group is represented by a single species, *L. aquilinum* from the Daba Shan (western Hubei). This group shares the symmetric aedeagus without internal spine (Figs 246–247) with the *L. varisternale* group, but is distinguished particularly by the completely divided female tergite IX, as well as by the rather stout and short ventral process of the aedeagus, and by the shape and chaetotaxy of the male sternites VII and VIII (Figs 244–245).

The *L. varisternale* group is the most diverse and evidently the phylogenetically most recent of the species groups in the study region. It includes 13 species distributed in the Qinling Shan and adjacent mountain ranges (Gansu, Shaanxi): *L. varisternale*, *L. minicum*, *L. lunatum*, *L. falcatum*, *L. biforme*, *L. mawenliae*, *L. tectifforme*, *L. sociabile*, *L. brevitergale*, *L. huaense*, *L. brevilobatum*, *L. concameratum*, *L. inflexum*. Remarkably, all of these species, except *L. inflexum*, are subject to a more or less pronounced sexual size dimorphism. In addition, they are characterized by moderately large body size, the presence of shallow microsculpture on the head, a weakly pronounced sexual dimorphism of the protarsi, dense punctation of the abdomen (punctation of tergite VII not distinctly sparser than that of anterior tergites), symmetric and weakly to moderately modified male sternites VII and VIII (e.g., Figs 80–83), the chaetotaxy of the male sternites VII and VIII (middle of sternite VIII mostly narrow-

ly non-pubescent at least in posterior half, often also middle of sternite VII partly non-pubescent), the morphology of the symmetric aedeagus (ventral process slender, mostly laterally more or less compressed, and apically acute; dorsal plate lamellate and usually with more or less pronounced median carina; absence of sclerotized spines in internal sac; e.g., Figs 84, 90, 97), the oblong and posteriorly more or less strongly produced female sternite VIII (e.g., Figs 92, 98, by the undivided and relatively long anterior portion of the female tergite IX (at least nearly as long as tergite X; e.g., Fig. 110), and the distinctly convex or even angled (cross-section) female tergite X (e.g., Fig. 156).

The low degree of character divergence particularly in the species allied to *L. huaense* (*L. huaense*, *L. tectifforme*, *L. sociabile*, *L. brevitergale*, *L. brevilobatum*, *L. concameratum*) suggests that speciation has occurred only in the recent geological past. Interspecific character variation among the species of this group is not clinal, since up to three species were found in the same locality. Thus, the hypothesis that the different morphs belong to the same variable species had to be rejected.

## THE SPECIES OF THE STUDY REGION

### *Lathrobium dignum* Sharp, 1874

**Material examined. China:** 1♂, Jiangsu, Nanjing University of Agriculture, VII.1991, leg. Cooter (cAss); 1♀, Gansu, Xiahe (=Labrang) env., 35°11.5'N, 102°30.6'E, 2940 m, 19.–22.V.2005, leg. Hájek, Král & Ružička (cSch); 1♀ [teneral], Gansu, 27 km E Xiahe, Bagatan bridge, 2750 m, 6.VIII.1994, leg. Smetana (cSme); 1♀, Shaanxi, 15 km N Xi'an, bank of Wei He river near road to Xi'an airport, 34°24'N, 108°55'E, 400 m, 22.VIII.1995, leg. Wrase (cAss). **Russia:** 4 exs., Russian Far East, Ussuri mountain range, Nikolsk Ussuriysk, leg. Mandl (NHMW, cAss); 1♂, 1♀, Russian Far East, Ussuryk District, Kaymanovka, 27.VII.1992, leg. Beloborodov (NHMB, cAss); 1♀, Russian Far East, Artem env., Kaymanovka, 23.–26.VII.1992, leg. Beloborodov (NHMB); 2♂ [det. Schülke], Russian Far East, Lazovskyi district, Pasetshnaya river, 18.V.1997, leg. Sundukov (cSch).

**Comment.** The above specimen from Jiangsu represents the first confirmed primary record from China. The records from Shaanxi and Gansu require confirmation, since they are based exclusively on females. For illustrations of the male sexual characters see Koch (1939a).

### The *Lathrobium sinense* species group

#### *Lathrobium sinense* Herman, 2003 (Figs 3–18)

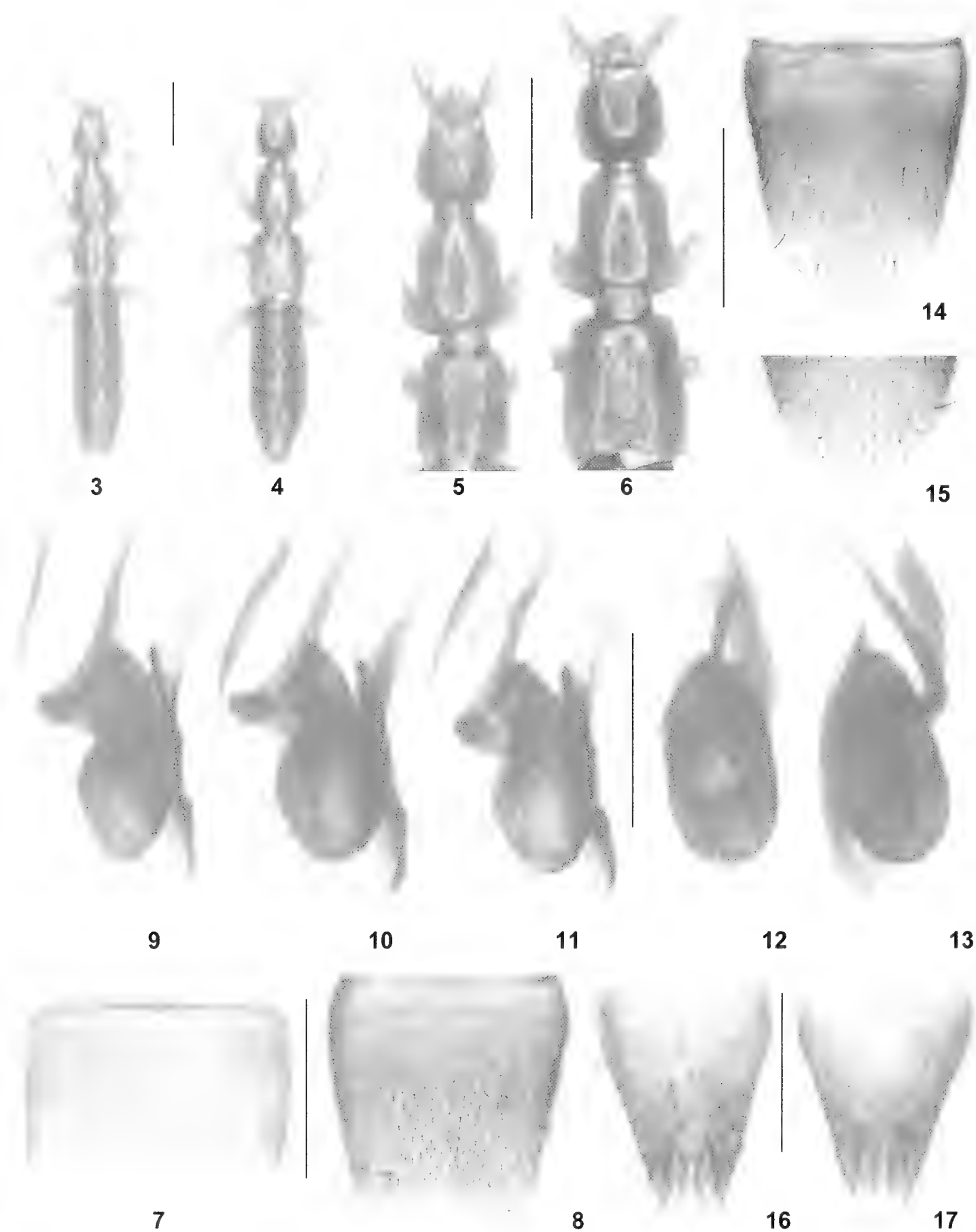
*Lathrobium* (s. str.) *chinense* Bernhauer, 1938: 36 f. (primary homonym).

*Lathrobium sinense* Herman, 2003: 6 (replacement name).

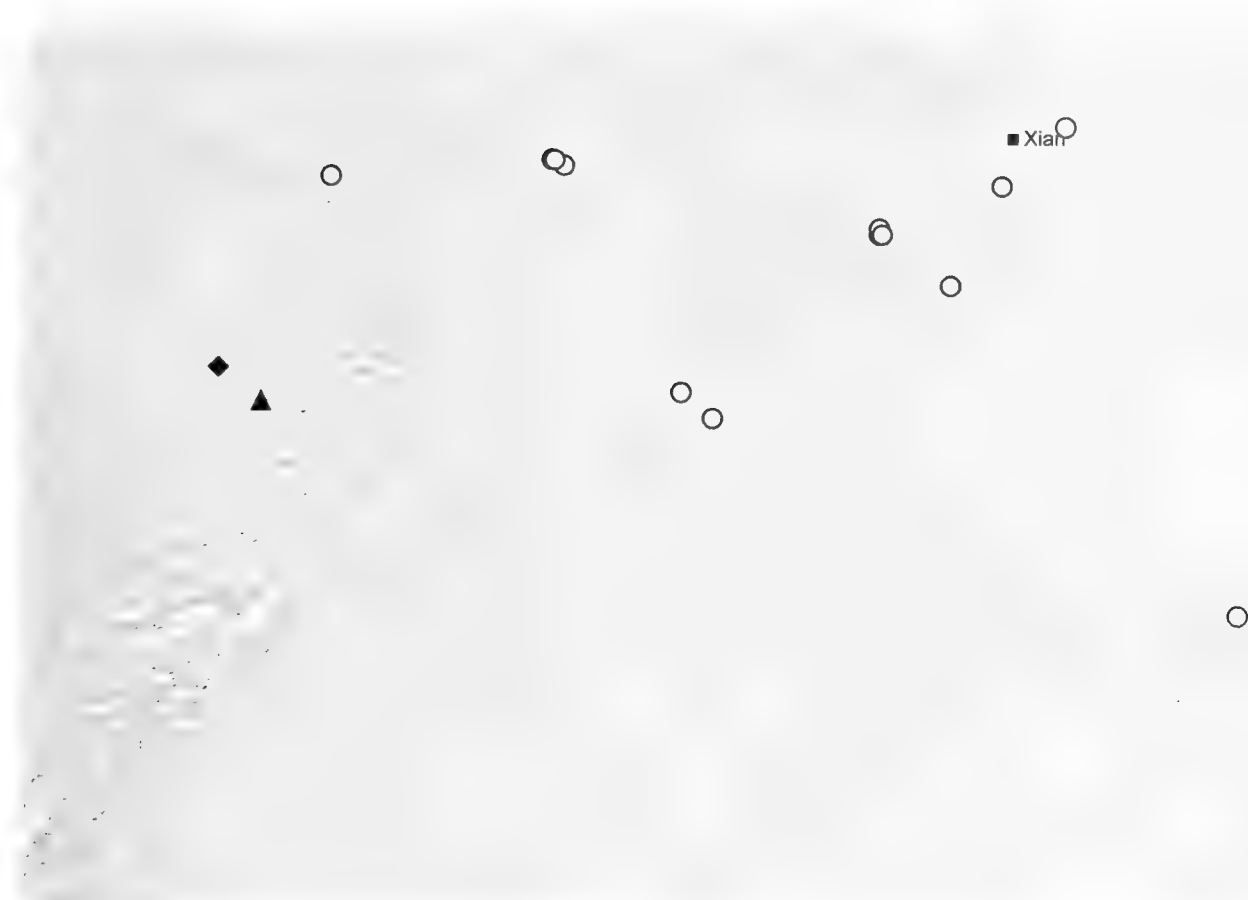
**Type material examined.** Lectotype ♂, present designation: “Nordwestl. China, Chinkiang, Col. Reitter / *chinense* Brnh. Type. / *chinense* Brnh. Typus *Lathrobium* / Chicago NHMus, M. Bernhauer Collection / *Lathrobium chinense* Bh. ♂, V.I. Gusarov det. 1993 / Lectotypus ♂ *Lathrobium chinense* Bernhauer, desig. V. Assing 2013 / *Lathrobium sinense* Herman, det. V. Assing 2013” (FMNH). Paralectotype ♀: “Nordwestl. China, Chinkiang, Col. Reitter / *chinense* Brnh. Cotypus *Lathrobium* / Chicago NHMus, M. Bernhauer Collection” (FMNH).

**Comment.** The original description of *Lathrobium chinense* is based on an unspecified number of syntypes from “Nordwestl. China: Chinkiang” (Bernhauer 1938). The name is a junior primary homonym of *Lathrobium chinense* Boheman, 1858 and was replaced with the nomen novum *L. sinense* by Herman (2003). Two syntypes, a male and a female which had been dissected by V. Gusarov, were located in the Bernhauer collection. The male is designated as the lectotype.

**Additional material examined. China, Gansu:** 2♂, 3♀, W-Qinling Shan, 43 km N Chengxian, 34°08'N, 105°47'E, 1750 m, moist stream valley with ponds, meadow with *Artemisia*, scraped from soil and collected from soil surface, 28.VII.2012, leg. Assing & Schülke (cAss, cSch); 1♂, 1♀, W-Qinling Shan, N Chengxian, 34°10'N, 105°42'E, 1830 m, stream valley with secondary deciduous forest, moist litter sifted, 29.VII.2012, leg. Assing” (cAss); 1♂, 5♀, W-Qinling Shan, 101 km NW Longnan, 34°03'N, 104°10'E, 2200 m, SW-slope with shrubs, litter sifted, 1.VIII.2012, leg. Assing & Schülke” (cAss, cSch); 2♀ [1♀ macropterous], W-Qinling Shan, 47 km N Chengxian, 34°10'N, 105°43'E, 1850 m, mixed secondary forest margin, litter sifted, 29.VII.2012, leg. Schülke & Wrase (cSch, cAss); 2♀, Xiahe (=Labrang) env., 35°11.5'N, 102°30.6'E, 2940 m, 19.–22.V.2005, leg. Hájek, Král & Ružička (cSch). **Sichuan:** 2♂, 4♀, Micang Shan, 42 km S Hanzhong, 32°41'N, 106°49'E, 1090 m, stream valley, secondary mixed forest, litter, grass, and herbs near path sifted, 17.VIII.2012, leg. Assing & Schülke (cAss, cSch); 1♀ [macropterous], Micang Shan, 42 km S Hanzhong, 32°41'N, 106°49'E, 1090 m, 14.VIII.2012, leg. Assing” (cAss). **Shaanxi:** 1♀, Qinling Shan, SW Zhouzhi, 33°44'N, 107°58'E, 1900 m, mixed forest, litter and soil sifted, 25.VII.2012, leg. Assing (cAss); 5♂, 1♀, Qinling Shan, 105 km SW Xi'an, pass on road Zhouzhi–Foping, N-slope, 33°46'N, 107°58'E,



**Figs 3–17.** *Lathrobium sinense*. **3.** Habitus of brachypterus male. **4.** Habitus of macropterus female. **5.** Forebody of brachypterus male. **6.** Forebody of macropterus female. **7.** Male sternite VII. **8.** Male sternite VIII. **9–11.** Aedeagus in lateral view of males from Shaanxi (**9**) and two localities in Gansu (**10–11**). **12.** Aedeagus in ventral view. **13.** Aedeagus in dorsal view. **14.** Female sternite VIII (Shaanxi). **15.** Posterior portion of female sternite VIII (Gansu). **16–17.** Tergites IX–X of females from Shaanxi (**16**) and Gansu (**17**). Scale bars: 3–6: 1.0 mm; 7–17: 0.5 mm.



**Fig. 18.** Distributions of species of the *L. sinense* group (open symbols) and the *L. gansuense* group (filled symbols): *L. sinense* (open circles; record from Jiangsu not shown); *L. detruncatum* (filled diamond); *L. brevisternale* (filled triangle).

1700 m, small creek valley, mixed deciduous forest, sifted, 3.VII.2001, leg. Schülke & Smetana (cSch, cSme, cAss); 2♀ [1 teneral], Qinling Shan, 105 km SW Xi'an, pass on road Zhouzhi–Foping, 33°44'N, 107°59'E, 1990 m, mixed deciduous forest with bamboo, sifted, 2.&4.VII.2001, leg. Schülke & Wrase (cSch); 2♂, 4♀ [1♂ teneral], Qinling Shan, 105 km SW Xi'an, pass on road Zhouzhi–Foping, 33°44'N, 107°58'E, 1880 m, sifted, 4.VII.2001, leg. Schülke (cSch, ZFMK); 2♀, Qinling Shan, 30 km SSW Xi'an, Autoroute km 33, 108°49'E, 34°00'N, 600 m, river valley, sifted, 31.VIII.1995, leg. Schülke (cSch); 1♀, 31 km E Xi'an, Li Shan near Lintong, 34°20'N, 109°16'E, 1000–1200 m, 23.& 25.VIII.1995, leg. Wrase (cSch); 1♂, 2♀, Ningshan County, Huoditang, 33°26'N, 108°27'E, 1500–1700 m, 12.VII.2012, leg. Chen, Li, Ma, Zhao & Pan (SNUC); 1♂, 1♀ [♀ macropterous], same data, but Nanzheng County, Liping National Forest Park, 32°50'N, 106°36'E, 1400–1600 m, 12.VII.2012, leg. Chen, Li, Ma, Zhao & Pan (SNUC). **Hubei:** 3♀ [1 macropterous], 2 exs. without abdominal apex, Daba Shan, pass E Da Shennongjia, 12 km NW Muyuping, 31°30'N, 110°21'E, 1950–2050 m, mixed deciduous forest, sifted, 16.-22.VII.2001, leg. Schülke & Wrase (cSch, cAss). **Without exact data:** 1♂, S-Shaanxi/W-Hubei, VII.2001, leg. Wrase (cSch).

**Description.** Relatively small, wing-dimorphic species; body length 4.9–6.3 mm; length of forebody 2.6–2.9 mm (brachypterous morph), 2.8–3.0 mm (macropterous morph). Habitus of both morphs as in Figs 3–4. Coloration variable: head reddish to blackish-brown; pronotum and elytra reddish to dark-brown, mostly at least slightly paler than head; abdomen reddish to blackish-brown; legs dark-yellowish; antennae reddish.

Head (Figs 5–6) oblong, approximately 1.05–1.10 times as long as broad; posterior angles moderately marked; punctation variable, usually moderately coarse and not particularly dense, even sparser in median dorsal portion; interstices in median dorsal portion broader, in anterior, lateral, and posterior dorsal portions narrower, as broad as, or broader than average diameter of punctures; microsculpture shallow, but distinct. Eyes relatively large, composed of > 50 defined ommatidia, approximately half the length of postocular region in dorsal view, and nearly half as long as postocular region in lateral view. Antenna 1.6–1.7 mm long.

Pronotum (Figs 5–6) slender 1.25–1.30 times as long as broad and slightly broader than head; punctation similar to that of head; impunctate midline of moderate width; interstices without microsculpture.

Elytra of variable length, 0.65–0.85 times (brachypterous morph; Fig. 5) or 0.90–1.05 times (macropterous morph; Fig. 6) as long as pronotum; punctation rather

sparse, fine, and shallow; interstices without microsculpture. Hind wings dimorphic, either fully developed (macropterous morph) or of reduced length (brachypterous morph). Protarsomeres I–IV with weakly pronounced sexual dimorphism.

Abdomen with very fine and very dense punctation, punctures not distinctly sparser on tergite VII than on tergites III–VI; interstices with fine and distinct microreticulation; posterior margin of tergite VII in macropterous morph with, in brachypterous morph without palisade fringe; posterior margin of tergite VIII convex, shape subject to some variation, but without sexual dimorphism.

♂: sternites III–VI unmodified; sternite VII moderately transverse, weakly depressed in the middle, with few darker and longer setae near posterior margin, posterior margin weakly concave, almost truncate (Fig. 7); sternite VIII approximately as long as broad or weakly oblong, pubescence weakly modified, posteriorly with ill-defined cluster of slightly denser setae on either side of the narrowly non-pubescent middle, posterior excision moderately deep and broadly V-shaped (Fig. 8); aedeagus (Figs 9–13) 0.8–1.0 mm long; ventral process short, laterally somewhat compressed, somewhat pointing right in ventral view, and straight in lateral view; dorsal plate lamellate, thin, apically pointed, without median carina, and basally very weakly sclerotized; internal sac with conspicuous, large and strongly sclerotized structure apically extending into a long and twisted spine.

♀: sternite VIII (Figs 14–15) oblong, 0.8–0.9 mm long, moderately to strongly convex posteriorly; tergite IX broadly undivided anteriorly; relative lengths of tergites IX and X variable, tergite X somewhat shorter to slightly longer than tergite IX in the middle (Figs 16–17).

**Intraspecific variation.** *Lathrobium sinense* is subject to considerable intraspecific variation, not only of external characters such as size, coloration, punctation, length of elytra and hind wings, the shape of the posterior margin of tergite VIII, the shape of the female sternite VIII (Figs 14–15), and the relative lengths of the female tergites IX–X (Figs 16–17), but also of the male primary and secondary sexual characters, particularly the shape of the ventral process of aedeagus (Figs 9–11). At least the variability of the ventral process of the aedeagus appears to be clinal to some extent, suggesting reduced gene flow between populations.

Unlike all other congeners from the study region, *L. sinense* is wing-dimorphic, this dimorphism not only affecting the length of the elytra and hind wings, but also the presence/absence of the palisade fringe at the posterior margin of tergite VII. The presence of a macropterous morph explains why *L. sinense* is more widespread (Fig. 18) than its micropterous congeners in the Qinling Shan and the Daba Shan. Four in a total of 53 examined specimens are macropterous; all of them are females.

**Comparative notes.** The male sexual characters do not suggest closer relationships to any of the other species known from the Qinling Shan and the Daba Shan. *Lathrobium sinense* is readily distinguished from them by its wing dimorphism, the relatively long elytra even in the brachypterous morph, the oblong head, the shapes and chaetotaxy of the male sternites VII and VIII, the shape of the female sternite VIII, and particularly by the derived morphology of the aedeagus (shape of ventral process, basally conspicuously large and apically spine-shaped internal structure).

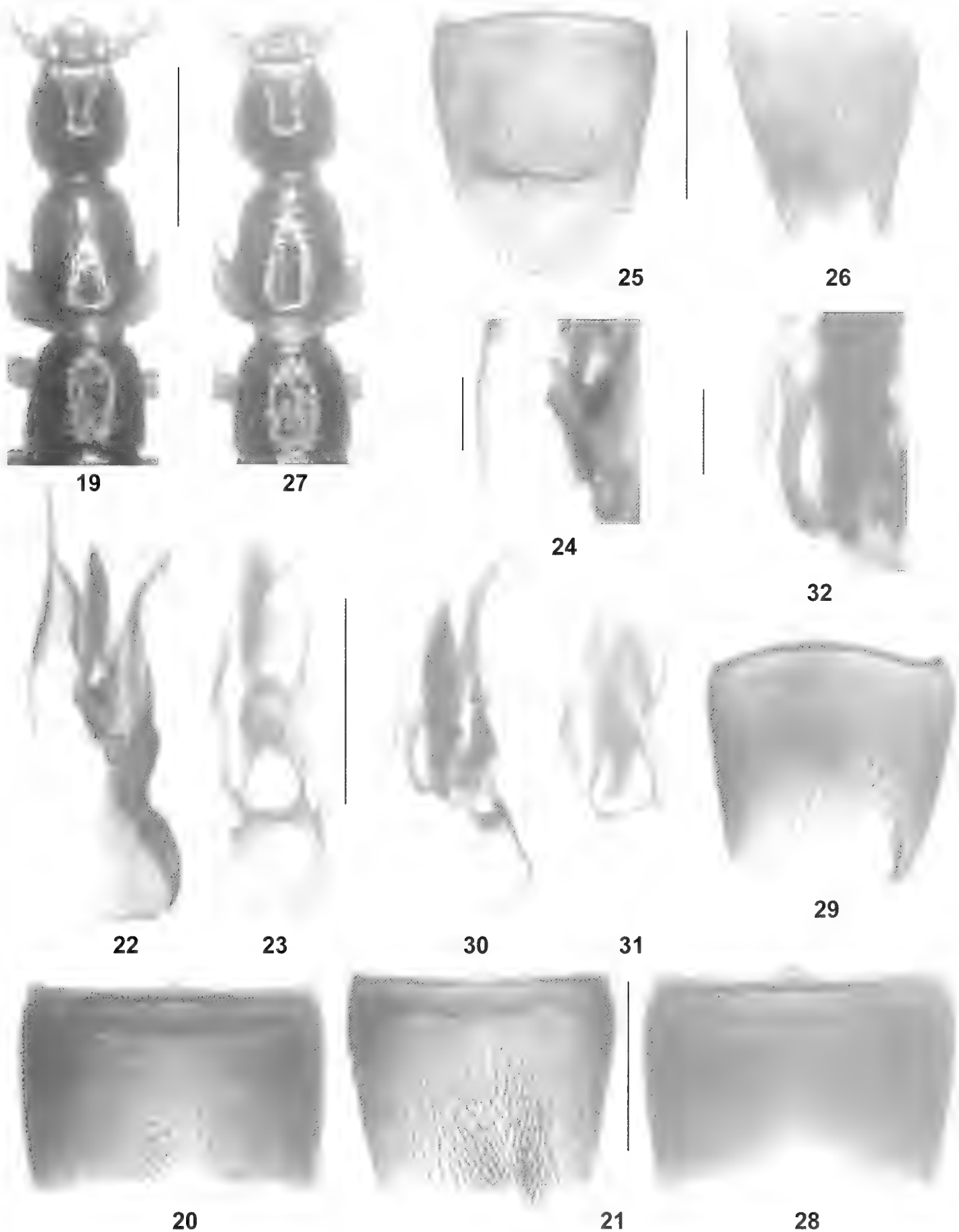
**Distribution and natural history.** The currently known distribution ranges from southern Gansu across the Qinling Shan and the Daba Shan to Jiangsu in East China (Fig. 18). The species appears to live in a wide range of habitats. Many specimens were sifted from leaf litter and moss in mixed deciduous forests and shrubland habitats, others collected in grassland or from soil in wetlands. The elevations range from 600 up to 2940 m. Syntopic species are *L. bifforme*, *L. lunatum*, *L. longispinosum*, *L. crassispinosum*, *L. fissispinosum*, *L. curvispinosum*, *L. bifidum*, *L. tectifforme*, *L. brevitergale*, *L. concameratum*, and *L. effeminatum*. The sex ratio in the samples (17♂ : 35♀) is biased in favour of females. Two specimens collected in July are teneral.

### The *Lathrobium gansuense* species group

#### *Lathrobium gansuense* sp. n. (Figs 19–26, 42)

**Type material.** Holotype ♂: “CHINA [10] - S-Gansu, W-Qinling Shan, NW Longnan, 34°14'32"N, 103°54'29"E, 3000 m, 2.VIII.2012, V. Assing / Holotypus ♂ *Lathrobium gansuense* sp. n., det. V. Assing 2012” (cAss). Paratypes: 24♂, 17♀: same data as holotype (cAss); 21♂, 13♀: “CHINA: S-Gansu [CH12-10], W-Qinling Shan, 132 km NW Longnan, Lazikou pass, 34°14'32"N, 103°54'29"E, 3000 m, N-slope, pasture with shrubs, litter sifted, 2.VIII.2012, leg. M. Schülke” (cSch, ZFMK); 3♂, 1♀ [♀ teneral]: “CHINA [11] - S-Gansu, W-Qinling Shan, NW Longnan, 34°07'57"N, 103°56'15"E, 2260 m, 3.VIII.2012, V. Assing” (cAss); 1♀: “CHINA (S.Gansu) W.Qinling Shan, 125 km NW Longnan, Lazidou pass, S.side, Zhuli valley, 34°07'57"N, 103°56'15"E, 2260 m (N.slope, mixed forest, oak/pine near creek, moss, litter sifted) 3.VIII. 2012 D.W. Wrase [11]” (cSch).

**Etymology.** The specific epithet (adjective) is derived from the name of the province where the type locality is situated and represents an analogy to *L. shaanxiense*, the name of its closest relative.



**Figs 19–32.** *Lathrobium gansuense* (19–26) and *L. declive* (27–32). 19, 27. Forebody. 20, 28. Male sternite VII. 21, 29. Male sternite VIII. 22–23, 30–31. Aedeagus in lateral and in ventral view. 24, 32. Sclerotized internal structure of aedeagus in lateral view. 25. Female sternite VIII. 26. Female tergites IX–X. Scale bars: 19, 27: 1.0 mm; 20–23, 25–26, 28–31: 0.5 mm; 24, 32: 0.1 mm.

**Description.** Small species without sexual size dimorphism; body length 5.3–6.8 mm; length of forebody 2.5–2.8 mm. Coloration: forebody dark reddish-brown to dark-brown; legs and antennae pale-reddish.

Head (Fig. 19) oblong, usually 1.10–1.15 times as long as broad; posterior angles weakly pronounced; punctation rather coarse and dense, sparser in median dorsal portion; interstices narrower than average diameter of punctures in lateral, anterior, and posterior portion, somewhat broader than diameter of punctures in median dorsal portion; microsculpture very shallow, but distinct. Eyes relatively large, composed of > 50 weakly defined ommatidia, approximately 1/3 the length of postocular region in dorsal view, and approximately 0.35 times as long as postocular region in lateral view. Antenna 1.4–1.5 mm long.

Pronotum (Fig. 19) 2.5–1.30 times as long as broad and 1.05–1.10 times as broad as head; punctation similar to that of head, but somewhat sparser; midline broadly impunctate; interstices without microsculpture.

Elytra (Fig. 19) moderately short, approximately 0.6 times as long as pronotum; punctation rather sparse, fine, and shallow; interstices without microsculpture. Hind wings completely reduced. Protarsomeres I–IV with moderate sexual dimorphism.

Abdomen with fine and dense punctation, punctures only slightly sparser on tergite VII than on III–VI; interstices with fine and distinct microreticulation; posterior margin of tergite VII without palisade fringe; posterior margin of tergite VIII weakly convex, without sexual dimorphism.

♂: protarsomeres I–IV moderately and rather variably dilated; sternites III–VI unmodified; sternite VII moderately transverse, with rather extensive and shallow median impression posteriorly, this impression with rather weakly modified long black setae, posterior margin weakly and broadly concave, weakly asymmetric (Fig. 20); sternite VIII asymmetric, weakly transverse, with distinct, oblique median impression, this impression with cluster of moderately modified black setae on either side of middle, posterior margin with shallow excision of asymmetric shape and in asymmetric position (Fig. 21); aedeagus (Figs 22–24) approximately 0.9 mm long; ventral process distinctly asymmetric, broad in ventral view, and with acute and somewhat twisted and curved apex; dorsal plate lamellate, rather weakly sclerotized, apically conspicuously acute, needle-shaped, and with long, thin, and slender basal portion; internal sac with dark membranous structures and with short and stout, apically somewhat wrench-shaped sclerotized internal structure.

♀: protarsomeres I–IV distinctly dilated, but at least slightly less so than in male; sternite VIII approximately 0.8 mm long, moderately oblong, posterior margin convexly produced in the middle (Fig. 25); tergite IX anteriorly broadly undivided, posterior process short; tergite X distinctly shorter than tergite IX in the middle (Fig. 26).

**Comparative notes.** *Lathrobium gansuense* is undoubtedly most closely related to, and probably the sister species of *L. shaanxiense*, as can be inferred from the similar external morphology, the similar female terminalia, and particularly the similarly derived morphology of the male sexual characters (shape and chaetotaxy of the male sternites VII and VIII; aedeagus with distinctly asymmetric, basally broad, and apically acute ventral process, with long and slender basal portion of the dorsal plate, and with somewhat hook-shaped sclerotized spine in internal sac). It differs from *L. shaanxiense* by the apically less acute ventral process of the aedeagus (both in lateral and in ventral view), the apically needle-shaped dorsal plate (*L. shaanxiense*: apically convex in dorsal view), the shape of the internal sclerotized structure of the aedeagus, the less asymmetric shape and chaetotaxy of the male sternite VII, the more asymmetric male sternite VIII, and the slightly more oblong female sternite VIII.

**Distribution and natural history.** The species was discovered in two geographically close localities at and near the Lazikou pass in the western Qinling Shan, to the northwest of Longnan, southern Gansu (Fig. 42). Numerous specimens were sifted from moss and leaf litter in a moist pasture with shrubs at an altitude of 3000 m, some also in a mixed forest near a stream at an altitude of 2260 m, in the latter locality together with *L. lunatum*. Three of the paratypes are teneral.

#### *Lathrobium declive* sp. n. (Figs 27–32, 42)

**Type material.** Holotype ♂: “CHINA - Shaanxi, Qinling Shan, Houzhenzi to Taibai Shan, 3500 m, alpine meadows, 2.–4.VIII.1998, leg. Trýzna et al. / Holotypus ♂ *Lathrobium declive* sp. n., det. V. Assing 2012” (cAss).

**Etymology.** The specific epithet (Latin, adjective: oblique) refers to the shape of the posterior margin of the male sternite VIII.

**Description.** Body length 5.4 mm; length of forebody 2.7 mm. Coloration: forebody blackish-brown; abdomen blackish; legs and antennae pale-reddish.

External characters (Fig. 27) as in *L. gansuense*, except as follows:

Head with very shallow traces of microsculpture; abdomen with less pronounced microsculpture and with slightly sparser punctation.

♂: protarsomeres I–IV strongly dilated; sternites III–VI unmodified; sternite VII moderately transverse, pubescence not distinctly modified, posterior margin broadly concave in the middle, weakly asymmetric (Fig. 28); sternite VIII with rather deep and strongly asymmetric posterior excision, pubescence weakly modified (Fig. 29);

aedeagus (Figs 30–31) approximately 0.9 mm long; ventral process distinctly asymmetric, basally broad and apically acute in ventral view, subapically curved in lateral view; dorsal plate thin and lamellate, weakly sclerotized, and apically acute; internal sac with dark membranous structures and with moderately short, slender, and apically somewhat wrench-shaped sclerotized internal structure (Fig. 32).

♀: unknown.

**Comparative notes.** *Lathrobium declive* is clearly closely related to *L. gansuense* and allied species, as is suggested by the similarly derived morphology of the male sternite VIII and the aedeagus. Among the species of the *L. gansuense* group, it is externally most similar to *L. gansuense* and *L. shaanxiense*, but readily distinguished from them by the shape and chaetotaxy of the male sternite VIII, as well as by the shapes of the ventral process and the internal sclerotized structure of the aedeagus.

**Distribution and natural history.** The type locality is situated near the summit of the Taibai Shan, the highest mountain in the Qinling Shan range (Fig. 42). According to the data provided on the label, the holotype was collected in an alpine meadow at an altitude of 3500 m.

***Lathrobium shaanxiense* Chen, Li & Zhao, 2005**  
(Figs 33–38, 42)

**Type material examined.** Paratype ♂: “China: Shaanxi Prov., Baoji City, Taibaishan, alt. 2350–2750, 14-IIV-2004 [sic], Hu, Tang&Zhu leg. / Paratype *Lathrobium shaanxiensis* [sic] / Chen, Li & Zhao, 2012 [sic], SHNU collections” (cAss).

**Additional material examined. China: Shaanxi:** 2♂, 2♀ [1♀ teneral], SW Meixian, Qinling Shan, 34°01'31"N, 107°24'13"E, 1870 m, N-slope, secondary deciduous forest, near stream, litter and grass sifted, 26.VII.2012, leg. Assing & Schülke (cAss, cSch).

**Comment.** The external and particularly the male sexual characters leave no doubt that this species belongs to the *L. gansuense* group. Among the species of this group, it appears to be most closely allied to *L. declive* and *L. gansuense*, with which it shares the similarly derived shape and chaetotaxy of the male sternite VIII, as well as the similar morphology of the aedeagus. The male and female sexual characters are illustrated in Figs 33–38.

The above specimens represent the first records since the original description, which is based on a male holotype and a male paratype from “Taibaishan Conv. (alt. 2750–3300 m)” (Chen et al. 2005). The distribution is mapped in Fig. 42. One of the above females is teneral.

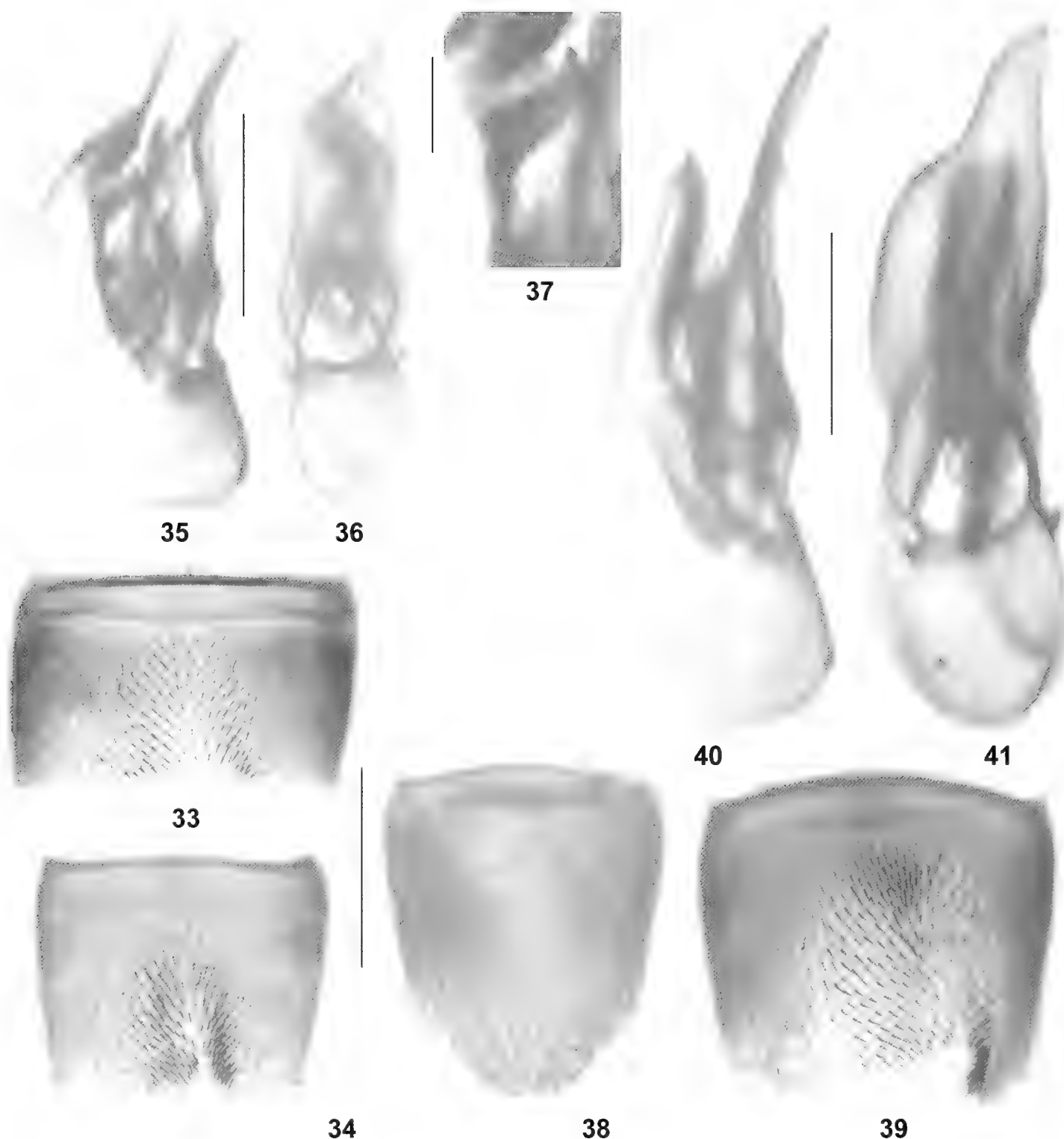
***Lathrobium heteromorphum* Chen, Li & Zhao, 2005**  
(Figs 39–41)

**Type material examined.** Paratype ♂: “China: Shaanxi Prov., Baoji City, Taibaishan, alt. 2350–2750, 14-IIV-2004 [sic], Hu, Tang&Zhu leg. / Paratype *Lathrobium heteromorphum* / Chen, Li & Zhao, 2012 [sic], SHNU collections” (cAss).

**Comment.** This species belongs to the *L. gansuense* group, as can be inferred particularly from the similarly derived morphology of the asymmetric ventral process of the aedeagus and by the shape and chaetotaxy of the strongly asymmetric male sternite VIII. The latter and the shape of the morphology of the aedeagus somewhat resemble those of *L. declive*, from which *L. heteromorphum* is readily distinguished by the distinctly larger body size (length of forebody: 3.2 mm), the paler coloration (forebody reddish; abdomen brown with reddish apex), the distinctly denser punctuation of the forebody, the much more strongly modified setae on the male sternite VIII (Fig. 39), and the distinctly larger (1.5 mm) and differently shaped aedeagus (Figs 40–41). *Lathrobium heteromorphum* has been recorded only from the type locality, the Taibai Shan.

***Lathrobium biapicale* sp. n.** (Figs 42–54)

**Type material.** Holotype ♂: “CHINA [19] - N-Sichuan, N Songpan, 33°03'15"N, 103°43'36"E, 3390 m, spruce forest, sifted, 9.VIII.2012, V. Assing / Holotypus ♂ *Lathrobium biapicale* sp. n., det. V. Assing 2012” (cAss). Paratypes: 11♂, 19♀: same data as holotype (cAss; MNHUB); 6♂, 4♀: “CHINA: N-Sichuan [CH12-19], 47 km N Songpan, road S 301 km 118, N Gongangling pass, 33°03'15"N, 103°43'36"E, 3390 m, spruce forest with shrubs, litter, moss & mushrooms sifted, 9.VIII.2012, leg. M. Schülke” (cSch); 3♂, 1♀: “CHINA [21]- N-Sichuan, N Songpan, 33°04'31"N, 103°42'38"E, 3230 m, spruce forest, sifted, 9.VIII.2012, V. Assing” (cAss); 3♂, 1♀: “CHINA: N-Sichuan [CH12-21], 49 km N Songpan, road S 301 km 114, N Gongangling pass, 33°04'31"N, 103°42'38"E, 3230 m, spruce forest, litter, moss & mushrooms sifted, 9.VIII.2012, leg. M. Schülke” (cSch); 1♀: “CHINA: N-Sichuan [CH12-20], 60 km N Songpan, road S 301 km 103, N Gongangling pass, 33°10'06"N, 103°43'13"E, 3000 m, forest near creek, litter sifted, 9.VIII.2012, leg. M. Schülke” (cSch); 3♂, 2♀: “CHINA [23]- N-Sichuan, pass ENE Songpan, 3920 m, 32°44'23"N, 103°44'31"E, sifted, 10.VIII.2012, V. Assing” (cAss); 16♂, 24♀: “CHINA [24]- N-Sichuan, pass NW Songpan, 3600 m, 32°55'32"N, 103°25'56"E, sifted, 11.VIII.2012, V. Assing” (cAss, MNHUB); 5♂, 16♀: “CHINA: N-Sichuan [CH12-24], pass 35 km NNW Songpan, 32°55'32"N, 103°25'56"E, 3600 m, moist N-



**Figs 33–41.** *Lathrobium shaanxiense* (33–38) and *L. heteromorphum* (39–40). 33. Male sternite VII. 34, 39. Male sternite VIII. 35–36, 40–41. Aedeagus in lateral and in ventral view. 37. Sclerotized internal structure of aedeagus in lateral view. 38. Female sternite VIII. Scale bars: 33–36, 38–41: 0.5 mm; 37: 0.1 mm.

slope with *Salix* and other shrubs, litter, grass roots & moss sifted, 11.VIII.2012, leg. M. Schülke" (cSch); 8♂, 10♀: "CHINA (N-Sichuan) pass 35 km NNW Songpan 32°55'32"N, 103°25'56"E, 3600 m, (moist N-slope with *Salix*, other shrubs, litter, moss, soil sifted, 11.VIII.2012, D.W. Wrase [24]" (cSch); 7♂, 7♀: "CHINA [26] - N-Sichuan N Songpan, 33°15'26"N, 103°46'03"E, 2700 m, spruce forest with birch, 12.VIII.2012, V. Assing" (cAss,

MNHUB); 7♂, 3♀: "CHINA: N-Sichuan [CH12-26], 70 km N Songpan, road S 301, above Gan lake, N Gonggaling pass, 33°15'26"N, 103°46'03"E, 2700 m, spruce forest with birch, litter, mushrooms, moss, and dead wood sifted, 12.VIII.2012, leg. M. Schülke" (cSch, ZFMK); 1♀: "CHINA (N.Sichuan) 70 km N Songpan, road S 301, above Gan lake, 33°15'26"N, 103°46'03"E, 2700 m (spruce forest with birch, litter, moss, soil sifted)



**Fig. 42.** Distributions of species of the *L. gansuense* group (filled symbols) and the *L. varisternale* group (open symbols): *L. bi-apicale* (filled triangles); *L. gansuense* (filled circles); *L. shaanxiense* (filled diamonds); *L. declive* (filled star); *L. concameratum* (open circles); *L. sociabile* (open triangle).

12.VIII.2012, D.W. Wrase" (cSch); 1♂: "CHINA (Sichuan) Pass zw. Zhangla u. Jiuzhaigou, 3400–3500 m, 30.VI.1996, W. Heinz leg." (cSme).

**Etymology.** The specific epithet (Latin, adjective: with two apices) alludes to the apically bifid ventral process of the aedeagus.

**Description.** Size subject to weakly pronounced sexual dimorphism, males on average slightly larger; body length 6.0–8.2 mm (♂), 5.5–7.5 mm (♀); length of forebody 3.0–3.5 mm (♂), 2.8–3.4 mm (♀). Coloration: forebody dark-brown to blackish-brown; abdomen blackish-brown to blackish; legs dark-reddish to dark-brown with paler tarsi; antennae reddish.

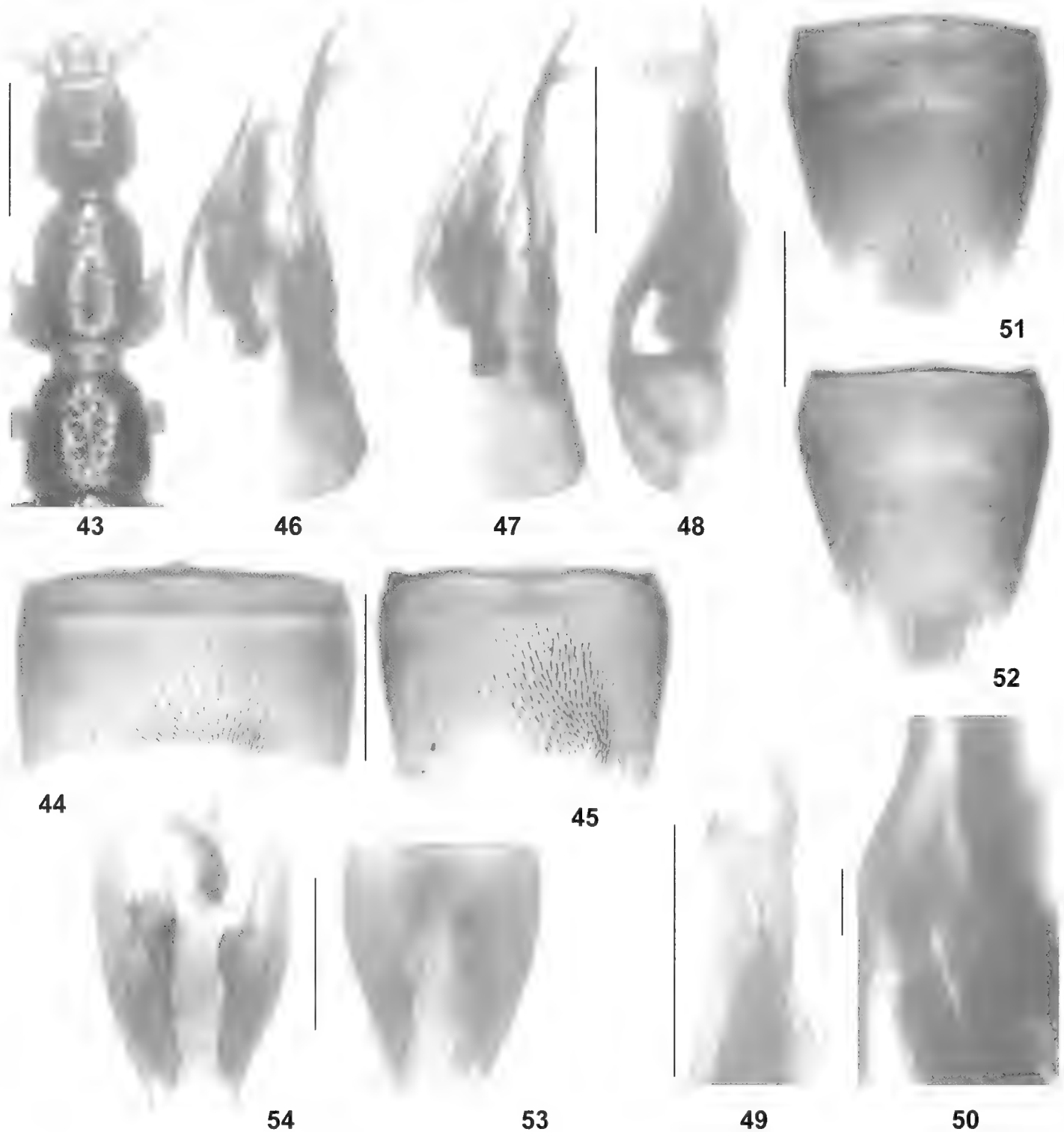
Head (Fig. 43) oblong, 1.05–1.10 times as long as broad; posterior angles moderately pronounced, rounded but noticeable; punctation moderately coarse and of somewhat variable density, sparser in median dorsal portion; interstices on average approximately as broad as diameter of punctures, somewhat broader than diameter of punctures in median dorsal portion; microsculpture shallow, but distinct. Eyes relatively large, composed of > 50 weakly defined ommatidia, 1/4–1/3 the length of postocular region in dorsal view. Antenna 1.6–1.8 mm long.

Pronotum (Fig. 43) approximately 1.3 times as long as broad and 1.05 times as broad as head; punctation similar to that of head; midline broadly impunctate; interstices without microsculpture.

Elytra (Fig. 43) moderately short, approximately 0.6 times as long as pronotum; punctation sparse, fine, and shallow; interstices without microsculpture. Hind wings completely reduced. Protarsomeres I–IV with moderate sexual dimorphism.

Abdomen with fine and dense punctation, punctures only slightly sparser on tergite VII than on tergites III–VI; interstices with fine and shallow microreticulation; posterior margin of tergite VII without palisade fringe; posterior margin of tergite VIII weakly convex to almost truncate, without evident sexual dimorphism.

♂: protarsomeres I–IV moderately and rather variably dilated; sternites III–VI unmodified; sternite VII strongly transverse and somewhat asymmetric, with rather extensive and shallow median impression, this impression with weakly modified long black setae, posterior margin broadly concave, with broad median concavity in asymmetric position (Fig. 44); sternite VIII asymmetric, strongly transverse, with oblique median impression, this impression with cluster of moderately modified short black setae, posterior margin broadly and very asymmetrically



**Figs 43–54.** *Lathrobium biapicale*. **43.** Forebody. **44.** Male sternite VII. **45.** Male sternite VIII. **46–48.** Aedeagus in lateral and in ventral view. **49.** Apical portion of ventral process of aedeagus in ventral view. **50.** Sclerotized internal structure of aedeagus in lateral view. **51–52.** Female sternite VIII. **53.** Female tergites IX–X. **54.** Apex of female abdomen in ventral view. Scale bars: 43: 1.0 mm; 44–49, 51–54: 0.5 mm; 50: 0.1 mm.

excised (Fig. 45); aedeagus (Figs 46–50) 1.4–1.5 mm long; ventral process distinctly asymmetric, broad in ventral view, apically with two lobes, the left one lamellate and the right one shaped like a spine (ventral view); dorsal plate lamellate, thin, and apically acute, without median carina; internal sac with short forked sclerotized spine and with additional dark membranous structures.

♀: protarsomeres I–IV distinctly dilated, but at least slightly less so than in male; sternite VIII (Figs 51–52) approximately 1.0 mm long, oblong, posterior margin with truncate projection in the middle; tergite IX anteriorly broadly undivided, posterior processes short; tergite X longer than tergite IX in the middle (Fig. 53); abdominal apex ventrally with oblique amorphous, moderately sclerotized sclerite (Fig. 54).

**Intraspecific variation.** The species is subject to rather pronounced intraspecific variation of size, the shape of the protarsomeres I–IV, the shape of the female sternite VIII (Figs 51–52) and also of the shape of the apices of the ventral process of the aedeagus. Both apices may vary in shape and length (Figs 48–49).

**Comparative notes.** The similarly derived shapes and chaetotaxy of the asymmetric male sternites VII and VIII, the morphology of the aedeagus (asymmetric ventral process; presence of a short sclerotized spine in internal sac; long, lamellate, and thin dorsal plate), the morphology of the female terminalia (posterior processes of tergite IX short; tergite IX anteriorly broadly undivided), and the external characters (oblong head; finely punctate elytra) suggest that *L. biapicale* belongs to the *L. gansuense* species group. It is distinguished from other representatives of this group particularly by the conspicuous morphology of the ventral process of the aedeagus, as well as by the shapes and chaetotaxy of the male sternites VII and VIII, and by the shape of the female sternite VIII. It differs from the syntopic *L. lentum* by the paler coloration, the more slender pronotum, the longer legs (particularly the longer tarsi), the more slender habitus, and by the completely different sexual characters.

**Distribution and natural history.** The species was found in great numbers in various localities near Songpan, northern Sichuan (Fig. 42). The specimens were sifted from leaf litter, moss, and grass roots in montane primary mixed and coniferous forests (spruce, birch, etc.), in subalpine rhododendron vegetation, and in subalpine shrub vegetation at altitudes of 2700–3920 m, in one locality together with *L. detruncatum* and *L. lentum*.

***Lathrobium detruncatum* sp. n.** (Figs 18, 55–62)

**Type material.** Holotype ♂: “CHINA [24]- N-Sichuan, pass NW Songpan, 3600 m, 32°55'32"N, 103°25'56"E, sifted, 11.VIII.2012, V. Assing / Holotypus ♂ *Lathrobium detruncatum* sp. n., det. V. Assing 2012” (cAss). Paratypes: 1♂, 1♀: same data as holotype (cAss); 2♂: “CHINA: N-Sichuan [CH12-24], pass 35 km NNW Songpan, 32°55'32"N, 103°25'56"E, 3600 m, moist N-slope with *Salix* and other shrubs, litter, grass roots & moss sifted, 11.VIII.2012, leg. M. Schülke” (cSch); 2♂: “CHINA (N-Sichuan) pass 35 km NNW Songpan 32°55'32"N, 103°25'56"E, 3600 m, (moist N-slope with *Salix*, other shrubs, litter, moss, soil sifted) 11.VIII.2012, D.W. Wrase [24]” (cAss).

**Etymology.** The specific epithet (Latin, adjective) alludes to the apically truncate dorsal plate of the aedeagus.

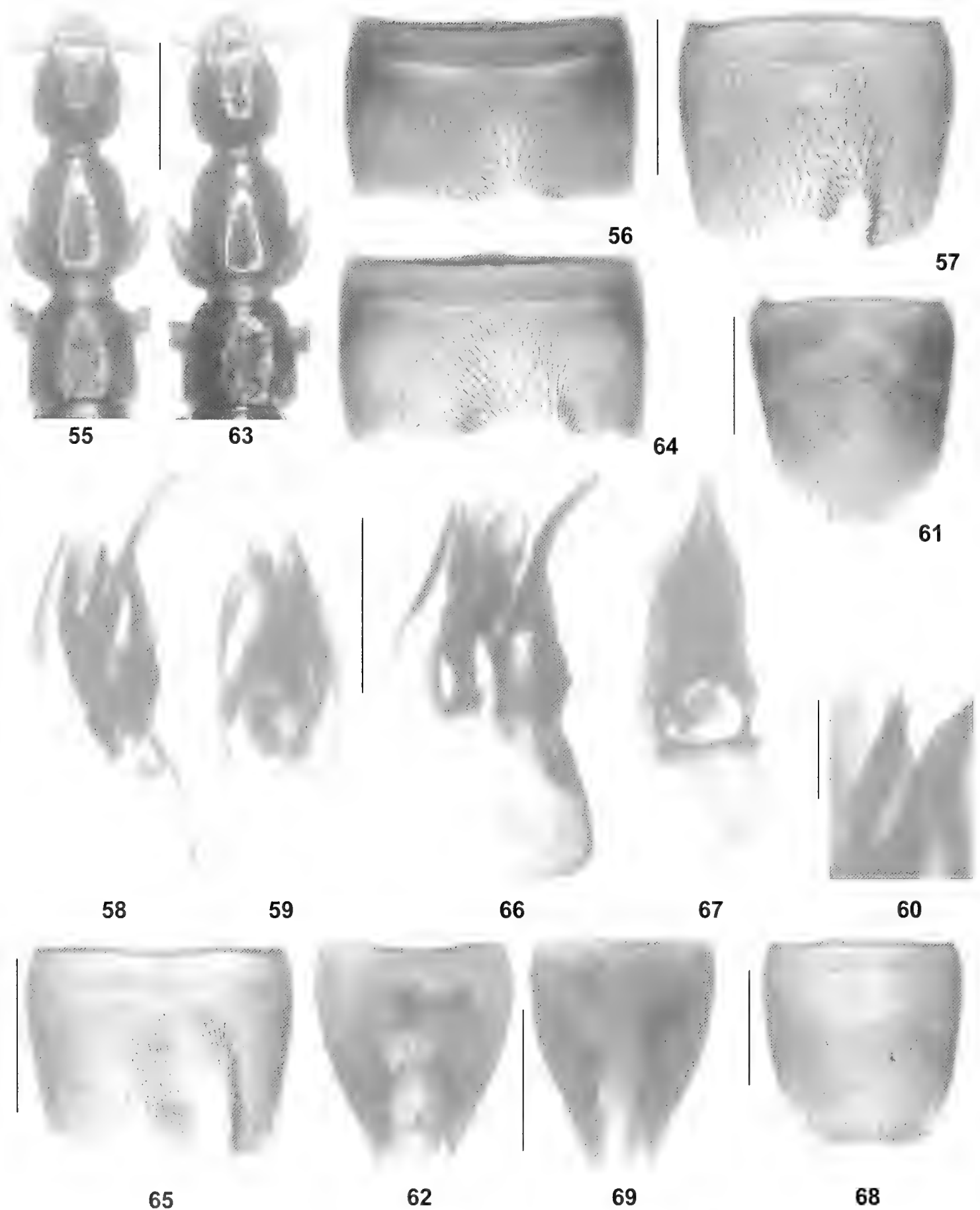
**Description.** Body length 7.0–7.5 mm (♂), 7.0 mm (♀); length of forebody 3.1–3.2 mm (♂), 3.1 mm (♀). Coloration: body blackish; legs yellowish-brown; antennae reddish. Microreticulation of head very shallow, often almost obsolete, except for frons where the microsculpture is usually more distinct. Other external characters (Fig. 55) as in *L. biapicale*.

♂: protarsomeres I–IV strongly dilated; sternites III–VI unmodified; sternite VII (Fig. 56) strongly transverse and somewhat asymmetric, with shallow and oblique median impression, this impression with weakly modified long black setae, posterior margin truncate, with very shallow median concavity in asymmetric position and with fringe of long marginal setae; sternite VIII (Fig. 57) strongly asymmetric, distinctly transverse, with oblique median impression, this impression with moderately modified short black setae posteriorly, posterior margin broadly, deeply, and very asymmetrically excised; aedeagus (Figs 58–60) approximately 1.2 mm long; ventral process distinctly asymmetric and apically acute; dorsal plate lamellate, thin, and apically truncate, without median carina, and with long and weakly sclerotized basal portion; internal sac with short forked sclerotized spine and with additional dark membranous structures.

♀: protarsomeres I–IV distinctly dilated, but slightly less so than in male; sternite VIII approximately 1.0 mm long, oblong, posterior margin with convex projection in the middle (Fig. 61); tergite IX anteriorly broadly undivided, posterior processes short; tergite X slightly shorter than tergite IX in the middle (Fig. 62).

**Comparative notes.** The similarly derived shapes and chaetotaxy of the asymmetric male sternites VII and VIII, the morphology of the aedeagus (asymmetric ventral process; presence of a short forked sclerotized spine in internal sac; long, lamellate, and thin dorsal plate), the morphology of the female terminalia (posterior processes of tergite IX short; tergite IX anteriorly broadly undivided), and the external characters (oblong head; finely punctate elytra) indicate that *L. detruncatum* belongs to the *L. gansuense* species group. Together with the following species, its hypothesized adelphotaxon, it is most closely related to *L. biapicale*, as can be inferred from the male secondary sexual characters and from the presence of a forked sclerotized spine in the internal sac of the aedeagus. It is distinguished from other representatives of this group particularly by the conspicuous morphology of the aedeagus, as well as by the shapes and chaetotaxy of the male sternites VII and VIII, and by the shape of the female sternite VIII, from the syntopic *L. biapicale* additionally by the on average paler legs and the more indistinct or even nearly obsolete microsculpture of the head.

**Distribution and natural history.** The type locality is situated to the northwest of Songpan, northern Sichuan (Fig.



**Figs 55–69.** *Lathrobium detruncatum* (55–62) and *L. brevisternale* (63–69). 55, 63. Forebody. 56, 64. Male sternite VII. 57, 65. Male sternite VIII. 58–59, 66–67. Aedeagus in lateral and in ventral view. 60. Sclerotized internal structure of aedeagus in lateral view. 61, 68. Female sternite VIII. 62, 69. Female tergites IX–X. Scale bars: 55, 63: 1.0 mm; 56–59, 61–62, 64–69: 0.5 mm; 60: 0.1 mm.

18). The specimens were sifted from grass roots, leaf litter, and moss on a moist north slope with *Salix* sp. and other shrubs at an altitude of 3600 m, together with numerous specimens of *L. biapicale* and *L. lentum*.

***Lathrobium brevisternale* sp. n.** (Figs 18, 63–69)

**Type material.** Holotype ♂: “CHINA [22]- N-Sichuan, pass ENE Songpan, 4080 m, 32°44'54"N, 103°43'43"E, sifted, 10.VIII.2012, V. Assing / Holotypus ♂ *Lathrobium brevisternale* sp. n., det. V. Assing 2012” (cAss). Paratypes: 2♀♀: same data as holotype (cAss); 1♀: “CHINA: N-Sichuan [CH12-22], Min Shan, pass 17 km NE Songpan, 32°44'54"N, 103°43'43"E, 4080 m, W-slope with scree and shrubs, litter and moss sifted, 10.VIII.2012, leg. M. Schülke” (cSch).

**Etymology.** The specific epithet (Latin, adjective) refers to the conspicuously short female sternite VIII, a character distinguishing *L. brevisternale* from all other species treated in this paper.

**Description.** Body length 7.3 mm (♂), 6.3–7.0 mm (♀); length of forebody 3.1 mm (♂), 2.9–3.0 mm (♀). Coloration: body blackish; legs brown; antennae reddish. Other external characters (Fig. 63) as in *L. biapicale*.

♂: protarsomeres I–IV strongly dilated; sternites III–VI unmodified; sternite VII (Fig. 64) strongly transverse and distinctly asymmetric, with shallow oblique median impression, this impression with weakly modified long black setae, posterior margin truncate, with broad and distinct median concavity in asymmetric position; sternite VIII (Fig. 65) strongly asymmetric, distinctly transverse, with distinct oblique latero-median impression, this impression extensively without setae in the middle and delimited by oblong cluster of moderately modified short black setae on either side, posterior margin strongly modified, distinctly bisinuate, posterior excision deep, rather narrow, and in lateral position; aedeagus (Figs 66–67) approximately 1.2 mm long; ventral process distinctly asymmetric and apically acute; dorsal plate lamellate, thin, and apically truncate, without median carina, and with long and weakly sclerotized basal portion; internal sac with short forked sclerotized spine and with additional dark membranous structures.

♀: protarsomeres I–IV distinctly dilated, but less so than in male; sternite VIII approximately 0.9 mm long, approximately as long as broad, posterior margin broadly convex, in the middle weakly concave (Fig. 68); tergite IX anteriorly broadly undivided, posterior processes short; tergite X approximately as long as tergite IX in the middle (Fig. 69).

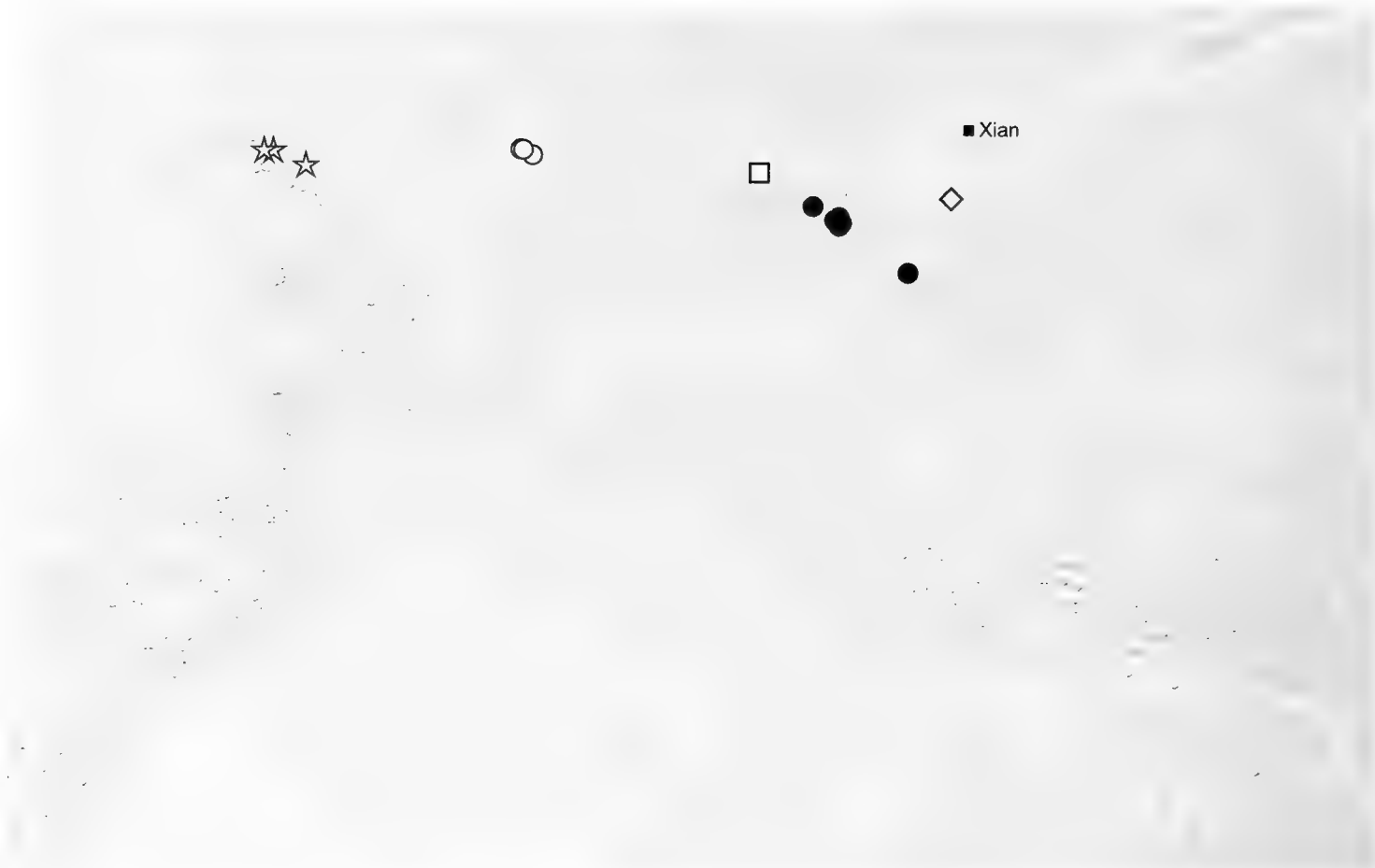
**Comparative notes.** *Lathrobium brevisternale* is probably the adelphotaxon of *L. detruncatum*, with which it not only shares similar external characters, but also similar modifications of the male sternites VII and VIII (sternite VII transverse, with oblique impression, and with shallow posterior concavity in asymmetric position; sternite VIII strongly asymmetric, with oblique impression, and with rather deep posterior excision in lateral position), as well as an aedeagus with an asymmetric, basally broad, and apically very acute ventral process and with an apically truncate dorsal plate. It differs from *L. detruncatum* by the darker legs, the more pronounced posterior concavity of the male sternite VII, the shape and chaetotaxy of the male sternite VIII, the basally broader, apically more slender (ventral view), and narrowly truncate apex (lateral view) of the ventral process of the aedeagus, and by the shorter, posteriorly not produced female sternite VIII.

**Distribution and natural history.** The type locality is situated in the Min Shan to the northeast of Songpan, northern Sichuan (Fig. 18). The specimens were sifted from litter beneath low subalpine shrub vegetation on a west slope with scree, at an altitude of 4080 m. No other *Lathrobium* species was present at the site.

**The *Lathrobium effeminatum* species group**

***Lathrobium effeminatum* sp. n.** (Figs 70–77)

**Type material.** Holotype ♂: “China Shaanxi Qinling pass rd. Zhouzhi Foping 105 km SW Xi'an / N-slope 1700 m 33°46'N 107°58'E 3.VII.2001 A. Smetana [C91] / Holotypus ♂ *Lathrobium effeminatum* sp. n., det. V. Assing 2012” (cAss). Paratypes: 4♂, 3♀: same data as holotype (cSme, cAss); 1♀: “CHINA Shaanxi Qinling Shan pass rd. Zhouzhi Foping 105 km SW Xi'an / N-slope 1990 m 33°44'N 107°59'E 2.VII.2001 A. Smetana [C89]” (cSme); 1♂: “China Shaanxi Qinling Shan above Houzhenzi 115 km WSW Xi'an / 1450 m, 33°50'N 107°47'E 5.VII.2001 A. Smetana [C95b]” (cAss); 1♀: “CHINA [1] - S-Shaanxi, SW Zhouzhi, Qinling Shan, 33°44'02"N, 107°58'06"E, 1900 m, 25.VII.2012, V. Assing” (cAss); 3♂, 10♀: “CHINA: S-Shaanxi (Qinling Shan), pass on rd. Zhouzhi-Foping, 105 km SW Xi'an, N-slope, 1700 m, 33°46'N, 107°58'E, leg. M. Schülke [C01-02] / 3.VII.2001, small creek valley, mixed deciduous forest, moss (sifted) [C01-02]” (cSch, cAss, ZFMK); 4♀: “CHINA: S-Shaanxi (Qinling Shan), pass on rd. Zhouzhi-Foping, 105 km SW Xi'an, N-slope, 1990 m, 33°44'N, 107°59'E, leg. M. Schülke [C01-01] / 2./4.VII.2001, small creek valley, mixed deciduous forest, bamboo, small meadows, dead wood, mushrooms (sifted) [C01-01]” (cSch, cAss); 1♂: “China: Shaanxi, Qin Ling Shan, 107.56 E, 33.45 N, Autoroute km 93 S of Zhouzhi, 108 km SW Xian, Mountain



**Fig. 70.** Distributions of species of the *L. effeminatum* group (filled symbols) and the *L. varisternale* group (open symbols): *L. effeminatum* (filled circles); *L. lunatum* (open stars); *L. biforme* (open circles); *L. varisternale* (open square); *L. brevilobatum* (open diamond).

Forrest [sic], sifted, 1650 m, 1.–2.09.1995, leg. M. Schülke” (cSch); 1♂: “China (Shaanxi) Qin Ling Shan/107.56E 33.45N, autoroute km 93 S Zhouzhi, 108 km SW Xian, mount.forest, 1650 m, 1.–2.IX.95 Wrase” (cSch); 1♀: “CHINA: S-Shaanxi (Qinling Shan), river bank above Houzhenzi, 115 km WSW Xi’an, 1450 m, 33°50’N, 107°47’E, leg. M. Schülke [C01-06] / 5.VII.2001, gravel bank (floating), mixed deciduous forest, most, mushrooms (sifted) [C01-06] (cSch); 2♀: “CHINA (S-Shaanxi) Qinling Shan, river bank above Houzhenzi, 115 km WSW Xi’an, 1450 m, 33°50’N, 107°47’E (mixed decid. for./moss/leaves-sifted) 4.VII.2001 Wrase [06]” (cSch); 6♂, 5♀: “CHINA: Shaanxi Prov., Ningshan County, Huoditang, 33°26’N, 108°27’E, 12.vii.2012, alt. 1,500–1,700 m, Chen, Li, Ma, Zhao & Pan leg.” (SNUC); 2♂, 5♀: same data, but “24–25.v.2008, alt. 1,700 m, Huang & Xu leg.” (SNUC); 6♂, 5♀: same data, but “Zhouzhi County, Qinling Daoban, 33°43’N, 107°58’E, 4.v.2008, alt. 1,900 m, Huang & Xu leg.” (SNUC); 6♂, 7♀, same data, but “Foping County, Foping N. R., 33°32’N, 107°57’E, 18.vii.2004, alt. 1,400–1,800 m, Hu, Tang & Zhu leg.” (SNUC).

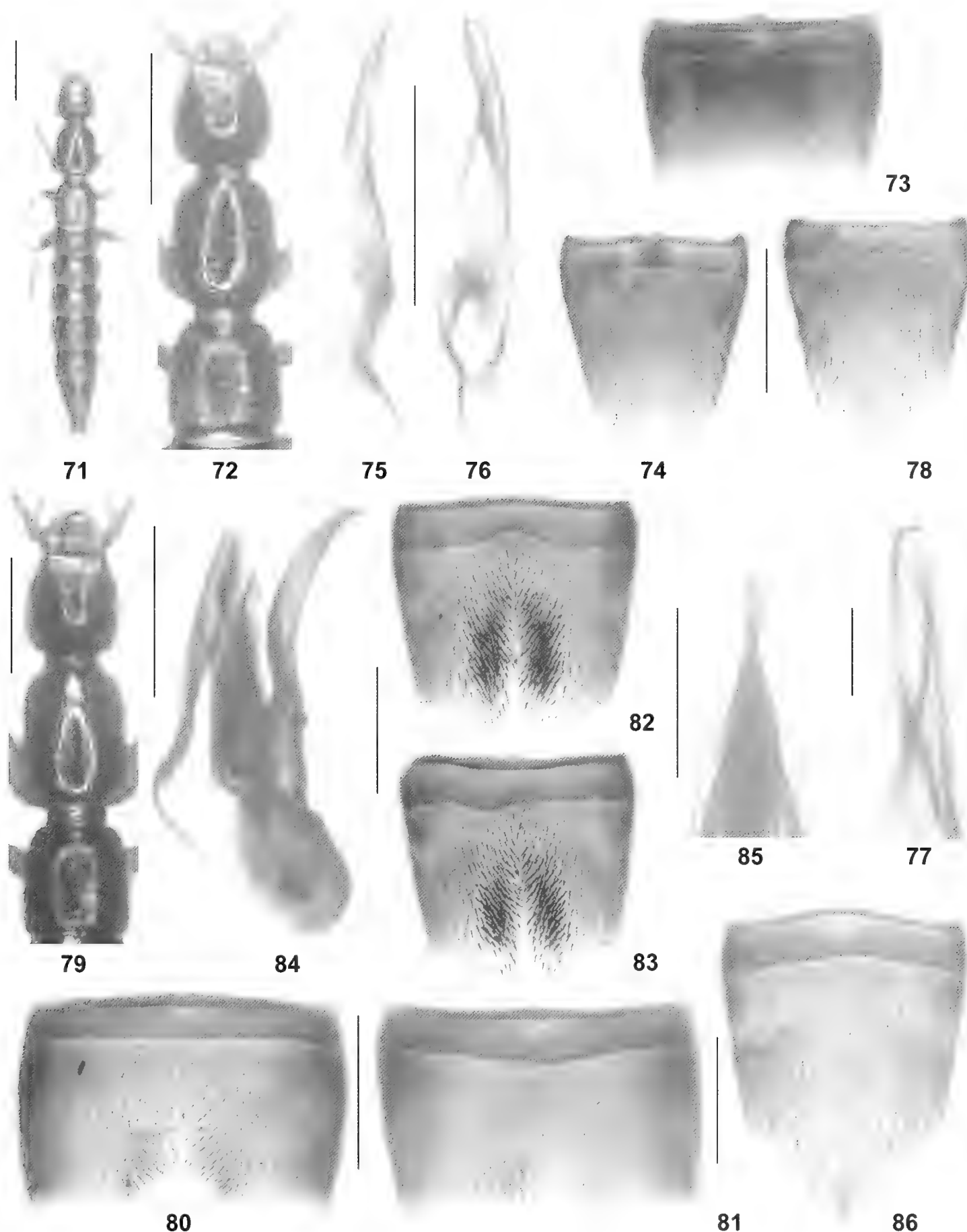
**Etymology.** The specific epithet (Latin, adjective) alludes to the weakly pronounced male sexual characters.

**Description.** Small species without sexual size dimorphism; body length 5.0–5.3 mm; length of forebody 2.4–2.8 mm. Habitus as in Fig. 71. Coloration: body brown to dark-brown; legs reddish to brown; antennae reddish.

Head (Fig. 72) weakly oblong or approximately as long as broad; posterior angles moderately pronounced, rounded but noticeable; punctation moderately coarse and of somewhat variable density, sparser in median dorsal portion; microsculpture shallow, but distinct. Eyes moderately large, of somewhat variable size, composed of < 50 weakly defined ommatidia, at least approximately one third the length of postocular region in dorsal view. Antenna 1.4–1.5 mm long.

Pronotum (Fig. 72) approximately 1.25 times as long as broad and slightly broader than head; punctation similar to that of head, but usually somewhat sparser; midline broadly impunctate; interstices without microsculpture.

Elytra (Fig. 72) short, approximately 0.55–0.60 times as long as pronotum; punctation variable, moderately sparse to moderately dense, defined or weakly defined; interstices without microsculpture. Hind wings completely reduced. Protarsomeres I–IV without appreciable sexual dimorphism, weakly dilated in both sexes.



**Figs 71–86.** *Lathrobium effeminatum* (71–78) and *L. varisternale* (79–86). 71. Habitus. 72, 79. Forebody. 73, 80–81. Male sternite VII (80: holotype; 81: paratype). 74, 82–83. Male sternite VIII (82: holotype; 83: paratype). 75–76, 84. Aedeagus in lateral and in ventral view. 77. Apical portion of ventral process of aedeagus in ventro-lateral view. 78, 86. Female sternite VIII. 85. Apical portion of aedeagus in ventral view. Scale bars: 71–72, 79: 1.0 mm; 73–76, 78, 80–86: 0.5 mm; 77: 0.1 mm.

Abdomen with fine and moderately dense punctation, punctures distinctly finer and sparser on tergites VII–VIII than on tergites III–VI; interstices with fine and shallow microreticulation; posterior margin of tergite VII without palisade fringe; posterior margin of tergite VIII weakly convex, without evident sexual dimorphism.

♂: sternites III–VII [sic] unmodified (Fig. 73); sternite VIII weakly modified, with convex posterior margin (Fig. 74); aedeagus (Figs 75–77) approximately 1.0 mm long, distinctly asymmetric; ventral process slender; internal sac with long and slender semi-transparent spine.

♀: sternite VIII approximately 0.8 mm long, oblong, and with strongly convex posterior margin (Fig. 78); tergite X distinctly longer than the undivided tergite IX in the middle.

**Comparative notes.** The male sexual characters do not suggest closer affiliations with any of the other species in the study region. In general appearance, *L. effeminatum* is similar to the species of the *L. gansuense* group, with which it also shares the relatively large eyes with weakly defined ommatidia. The species is readily separated from its congeners by the distinctive morphology of the aedeagus, the unmodified male sternite VII, the weakly modified and posteriorly convex sternite VIII, and the weakly dilated protarsi in both sexes.

**Distribution and natural history.** The distribution of this species is confined to the region to the southeast of the Taibai Shan in the Qinling Shan range, southern Shaanxi (Fig. 70). The specimens were sifted from leaf litter in mixed deciduous forests at altitudes from approximately 1450 up to 1990 m, partly together with *L. sinense*, *L. concameratum*, *L. tectifforme*, and/or *L. brevitergale*.

### The *Lathrobium varisternale* species group

#### *Lathrobium varisternale* sp. n. (Figs 70, 79–86)

**Type material.** Holotype ♂: “CHINA [2] - S-Shaanxi, SW Meixian, Qinling Shan, 34°01'31"N, 107°24'13"E, 1870 m, 26.VII.2012, V. Assing / Holotypus ♂ *Lathrobium varisternale* sp. n., det. V. Assing 2012” (cAss). Paratypes: 2♀: same data as holotype (cAss); 2♂, 4♀: “CHINA: S-Shaanxi [CH12-02], 42 km SW Meixian, 34°01'32"N, 107°24'13"E, 1875 m, N-slope, secondary deciduous forest near creek, litter & grass sifted, 26.VII.2012, leg. M. Schülke” (cAss, cSch, ZFMK).

**Etymology.** The specific epithet (Latin, adjective) refers to the remarkable variability of the posterior concavity of the male sternite VII.

**Description.** Size subject to distinct sexual dimorphism; body length 7.5–8.0 mm (♂), 6.7–7.5 mm (♀); length of forebody 3.7–3.8 mm (♂), 3.3–3.6 mm (♀). Coloration: forebody dark reddish-brown to blackish-brown; abdomen blackish-brown with dark-reddish apex (segments IX–X, posterior portion of segment VIII); legs and antennae reddish.

Head (Fig. 79) weakly oblong, 1.02–1.07 times as long as broad; punctation rather dense, sparser in median dorsal portion; interstices narrower than, or approximately as broad as diameter of punctures in lateral and posterior portions, somewhat broader than diameter of punctures in median dorsal portion; microsculpture very shallow, sometimes almost obsolete in median dorsal portion. Eyes moderately small, composed of > 30 ommatidia, approximately 1/4 the length of postocular region in dorsal view, and approximately 0.3 times as long as postocular region in lateral view.

Pronotum (Fig. 79) approximately 1.35 times as long as broad; punctation similar to that of head, but somewhat sparser; midline broadly impunctate; interstices without microsculpture.

Elytra (Fig. 79) short, approximately 0.55 times as long as pronotum; punctation moderately dense and somewhat variable, shallow, weakly defined to defined; interstices without microsculpture. Hind wings completely reduced.

Abdomen with fine and dense punctation; interstices with fine and distinct microreticulation, almost matt; posterior margin of tergite VII without palisade fringe; posterior margin of tergite VIII weakly convex, without sexual dimorphism.

♂: protarsomeres I–IV strongly dilated; sternites III–VI unmodified; sternite VII with shallow but extensive median impression with black and rather dense black setae, posterior margin weakly to strongly concave in the middle (Figs 80–81); sternite VIII with pronounced oblong median impression, this impression with an oblong cluster of dense black setae on either side of middle, posterior excision small and in symmetric position (Figs 82–83); aedeagus (Figs 84–85) approximately 1.3 mm long, symmetric; ventral process long, slender, curved in lateral view, and apically acute; dorsal plate large, with long, lamellate, basally curved, and distinctly sclerotized apical portion, and with short, weakly sclerotized basal portion; internal sac with dark membranous structures.

♀: protarsomeres I–IV distinctly dilated, but less so than in male; sternite VIII (Fig. 86) oblong, posterior margin strongly produced in the middle; tergite IX anteriorly undivided; tergite X strongly convex in cross-section, only indistinctly longer than tergite IX in the middle.

**Intraspecific variation.** This species is subject to a remarkable sexual dimorphism of body size. Moreover, the punctation of the forebody and even the shape of the ventral process are rather variable. Finally, the shape of the

posterior concavity of the male sternite VII (in the middle of the posterior margin) may range from weakly to strongly concave (Figs 80–81). However, the possibility that the weakly pronounced posterior concavity of the sternite VII of one of the male paratypes (Fig. 81) represents a teratological malformation cannot be ruled out with certainty.

**Comparative notes.** *Lathrobium varisternale* is characterized particularly by the male primary and sexual characters. It differs from the following species by the shape and chaetotaxy of the male sternites VII and VIII, as well as by the morphology of the aedeagus and the shape of the female sternite VIII.

**Distribution and natural history.** The type locality is situated in the Qinling Shan, to the southwest of Meixian (Fig. 70). The specimens were sifted from leaf litter and grass roots in a secondary deciduous forest near a stream at an altitude of 1870 m.

***Lathrobium biforme* sp. n.** (Figs 70, 87–93)

**Type material.** Holotype ♂: “CHINA [6] - S-Gansu, N Chengxian, W-Qinling Shan, 34°10'20"N, 105°42'10"E, 1830 m, 29.VII.2012, V. Assing / Holotypus ♂ *Lathrobium biforme* sp. n., det. V. Assing 2012” (cAss). Paratypes: 2♂, 3♀: same data as holotype (cAss); 1♂ [teneral], 1♀: “CHINA [4] - S-Gansu, N Chengxian, W-Qinling Shan, 34°08'16"N, 105°46'42"E, 1760 m, 28.VII.2012, V. Assing” (cAss); 1♀: “CHINA: S-Gansu [CH12-04], W-Qinling Shan, 47 km N Chengxian, 34°08'16"N, 105°46'42"E, 1760 m, N-slope, secondary deciduous forest margin, sifted, 28.VII.2012, M. Schülke” (cAss); 1♀: same data, but “[CH12-04c] ... S-slope ... litter between rocks sifted” (cSch); 1♀: “CHINA [5] - S-Gansu, N Chengxian, W-Qinling Shan, 34°10'17"N, 105°42'56"E, 1850 m, 29.VII.2012, V. Assing” (cAss); 1♂: “CHINA: S-Gansu [CH12-05], W-Qinling Shan, 47 km N Chengxian, 34°10'17"N, 105°42'56"E, 1850 m, mixed secondary forest margin, litter sifted, 29.VII.2012, M. Schülke” (cSch); 1♀: “CHINA (S. Gansu) W.Qinling Shan, 47 km N Chengxian 1850 m 34°10'17"N, 105°42'56"E (mixed secondary forest margin, litter sifted) 29.VII.2012 D.W. Wrase [05]” (cSch).

**Etymology.** The specific epithet (Latin, adjective) refers to the remarkable sexual size dimorphism.

**Description.** Size subject to pronounced sexual dimorphism; body length 8.0–9.0 mm (♂), 6.5–7.5 mm (♀); length of forebody 3.6–4.0 mm (♂), 3.2–3.5 mm (♀). Coloration: body blackish; legs dark-reddish with somewhat darker femora; antennae reddish.

Other external characters (Fig. 87) highly similar to those of *L. varisternale*.

♂: protarsomeres I–IV strongly dilated; sternites III–VI unmodified; sternite VII (Fig. 88) strongly transverse, narrowly without pubescence along the middle, with shallow median impression posteriorly, this impression with rather weakly modified setae directed obliquely postero-medial, posterior margin weakly concave in the middle; sternite VIII (Fig. 89) moderately transverse, symmetric, with distinct longitudinal impression in the middle, posterior excision moderately deep, moderately broad, and concave anteriorly; aedeagus (Figs 90–91) 1.4–1.5 mm long; ventral process slender and apically distinctly hooked in lateral view, weakly asymmetric in ventral view; dorsal plate long, apical portion lamellate, distinctly sclerotized, with median carina, and apically sharply pointed in dorsal view; internal sac without sclerotized spines, but with very dark membranous structure.

♀: protarsomeres I–IV dilated, but distinctly less so than in male; sternite VIII (Fig. 92) approximately 1.1 mm long, oblong, posterior margin strongly and almost triangularly produced in the middle; tergite IX anteriorly undivided; tergite X strongly convex, almost roof-shaped in cross-section, slightly shorter than tergite IX in the middle; abdominal apex ventrally with large dark amorphous sclerite (Fig. 93).

**Comparative notes.** Based on the external and sexual characters, *L. biforme* belongs to the *L. varisternale* group. It is distinguished from *L. varisternale* by larger body size, the more pronounced sexual size dimorphism, the darker coloration, and by the male and female sexual characters.

**Distribution and natural history.** The species was found in three adjacent localities in the western Qinling Shan, to the north of Chengxian (Fig. 70). The partly teneral specimens were sifted from moist leaf litter of secondary mixed and deciduous forests at altitudes of 1760–1850 m, in one locality together with *L. sinense*.

***Lathrobium lunatum* sp. n.** (Figs 70, 94–99)

**Type material.** Holotype ♂: “CHINA [11] - S-Gansu, W-Qinling Shan, NW Longnan, 34°07'57"N, 103°56'15"E, 2260 m, 3.VIII.2012, V. Assing / Holotypus ♂ *Lathrobium lunatum* sp. n., det. V. Assing 2012” (cAss). Paratypes: 4♂, 5♀ [1♀ teneral]: same data as holotype (cAss); 3♀: “CHINA: S-Gansu [CH12-11], W-Qinling Shan, 125 km NW Longnan, Lazikou pass, S-side, Zhuli valley, 34°07'57"N, 103°56'15"E, 2260 m, / N-slope, mixed forest with oak and pine near creek, litter and dead wood sifted, 3.VIII.2012, leg. M. Schülke” (cSch, ZFMK); 2♂: “CHINA (S.Gansu) W.Qinling Shan, 125 km NW Longnan, Lazikou pass, S.side, Zhuli valley, 34°07'57"N, 103°56'15"E, 2260 m (N.slope, mixed forest, oak, pine

near creek, moss, litter sifted) 3.VIII.2012 D.W. Wrase [11]" (cSch); 1♂, 1♀: "CHINA [9] - S-Gansu, W-Qinling Shan, NW Longnan, 34°03'14"N, 104°10'00"E, 2200 m, 1.VIII.2012, V. Assing" (cAss); 2♀: "CHINA: S-Gansu [CH12-09], W-Qinling Shan, 101 km NW Longnan, 34°03'14"N, 104°10'00"E, 2200 m, SW-slope with shrubs, litter sifted, 1.VIII.2012, leg. M. Schülke" (cSch); 2♂ [1 teneral]: "CHINA [12] - S-Gansu, W-Qinling Shan, NW Longnan, 34°08'14"N, 103°51'57"E, 2300 m, 3.VIII.2012, V. Assing" (cAss); 1♂: "CHINA: S-Gansu [CH12-12], W-Qinling Shan, 128 km NW Longnan, Lazikou pass, S-side, Laolong valley, 34°08'14"N, 103°51'57"E, 2300 m, S-slope with pine and spruce forest, litter sifted, 3.VIII.2012, M. Schülke" (cSch); 1♂: "CHINA (S.Gansu) W-Qinling Shan, 128 km NW Longnan, Lazikou pass, S-side, Laolong valley, 34°08'14"N, 103°51'57"E, 2300 m, (S.slope with pine and spruce forest, litter, moss sifted) 3.VIII.2012, D.W. Wrase [12]" (cAss).

**Etymology.** The specific epithet (Latin, adjective: crescent-shaped) refers to the shape of the ventral process of the aedeagus.

**Description.** Size subject to weak sexual dimorphism, males on average slightly larger; body length 8.5–9.5 mm (♂), 7.3–8.5 mm (♀); length of forebody 3.8–4.1 mm (♂), 3.4–4.0 mm (♀). Coloration: body blackish; legs dark-brown with paler tarsi, often also with paler tibiae; antennae reddish. Posterior margin of tergite VIII rather indistinctly, obtusely angled in the middle in both sexes. Other external characters (Fig. 94), except for the slightly finer punctuation of the head, highly similar to those of *L. biforme*.

♂: protarsomeres I–IV strongly dilated; sternites III–VI unmodified; sternite VII (Fig. 95) strongly transverse, with distinct median impression posteriorly, this impression with numerous moderately modified setae directed obliquely postero-mediad, posterior margin broadly concave, in the middle distinctly concave; sternite VIII (Fig. 96) weakly transverse, symmetric, with rather shallow, posteriorly widened median impression, this impression narrowly without setae in the middle, on either side of middle with extensive cluster of dense black setae, posterior excision very shallow; aedeagus (Fig. 97) approximately 1.3 mm long; ventral process laterally compressed, subapically curved (lateral view), and apically acute; dorsal plate lamellate, apically pointed (dorsal view), and with pronounced median carina, basal portion distinct and moderately long; internal sac with dark membranous structure.

♀: protarsomeres I–IV distinctly dilated, somewhat less so than in male; sternite VIII (Fig. 98) approximately 1.2 mm long, oblong, posteriorly strongly produced and almost acutely pointed; tergite IX undivided; tergite X convex in cross-section, distinctly longer than tergite IX in

the middle (Fig. 99); abdominal apex ventrally with weakly sclerotized amorphous sclerite.

**Comparative notes.** Like the preceding species, *L. lunatum* belongs to the *L. varisternale* group. It is distinguished from the externally highly similar *L. biforme* by the shape and chaetotaxy of the male sternites VII and VIII, as well as by the completely different morphology of the aedeagus (shape of ventral process, pronounced carina of the dorsal plate) and by the female terminalia (shape of sternite VIII, relative length of tergites IX and X, and the amorphous ventral sclerite).

**Distribution and natural history.** The species was found in three localities at or near the Lazikou pass, to the northwest of Longnan, in the western Qinling Shan, southern Gansu (Fig. 70). The specimens were sifted from leaf litter beneath shrubs, in a mixed forest, and in a coniferous forest at altitudes of 2200–2300 m, together with *L. sinense* and *L. gansuense*. Two paratypes are teneral.

***Lathrobium falcatum* sp. n.** (Figs 100–104, 111)

**Type material.** Holotype ♂: "CHINA: S-Gansu [CH12-04], W-Qinling Shan, 47 km N Chengxian, 34°08'16"N, 105°46'42"E, 1760 m, N-slope, secondary deciduous forest margin, sifted, 28.VII.2012, M. Schülke / Holotypus ♂ *Lathrobium falcatum* sp. n., det. V. Assing 2012" (cAss).

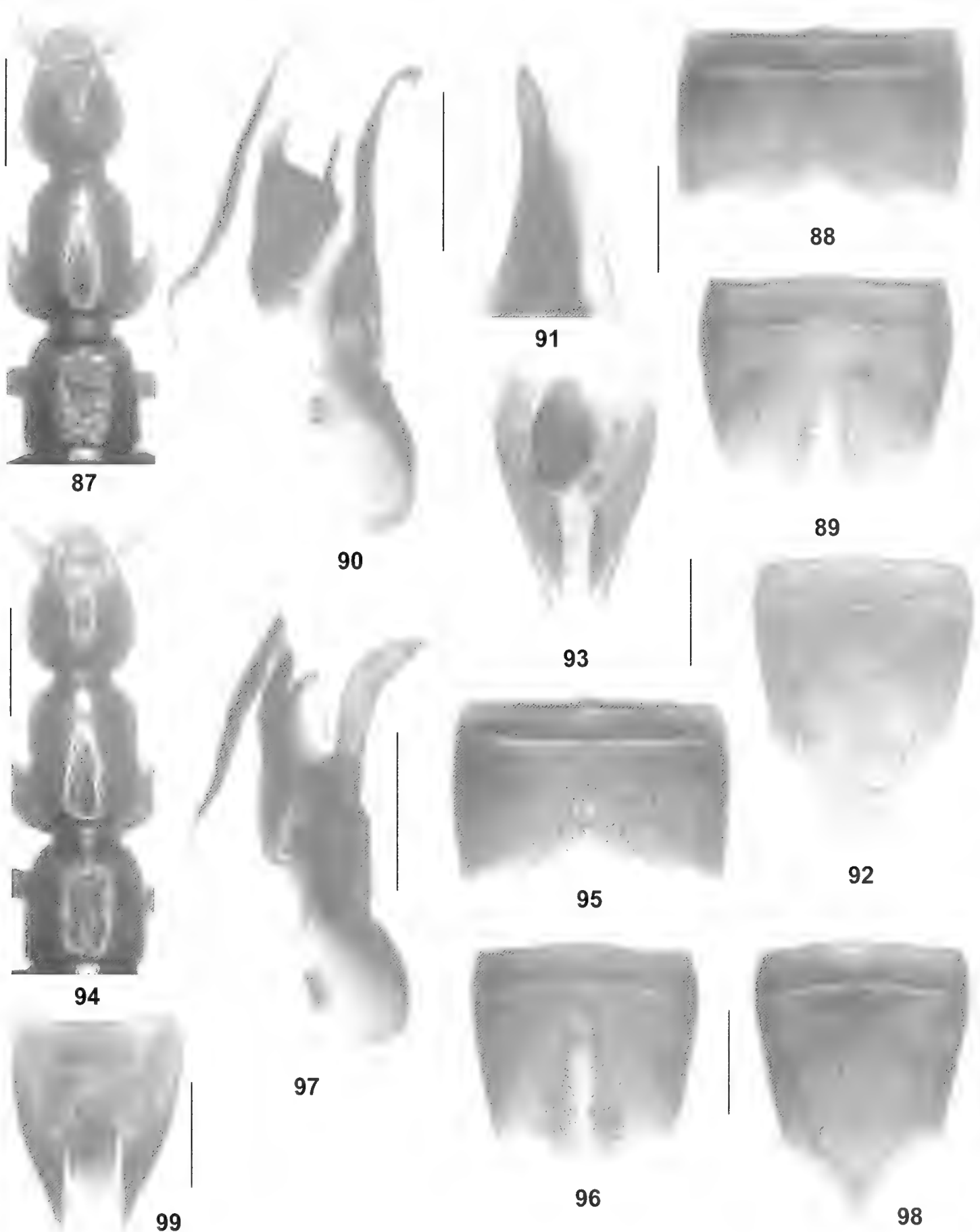
**Etymology.** The specific epithet (Latin, adjective: sickle-shaped) refers to the shape of the ventral process of the aedeagus, which somewhat resembles a sickle.

**Description.** Body length 8.5 mm; length of forebody 4.0 mm. Coloration: body blackish; legs and antennae reddish.

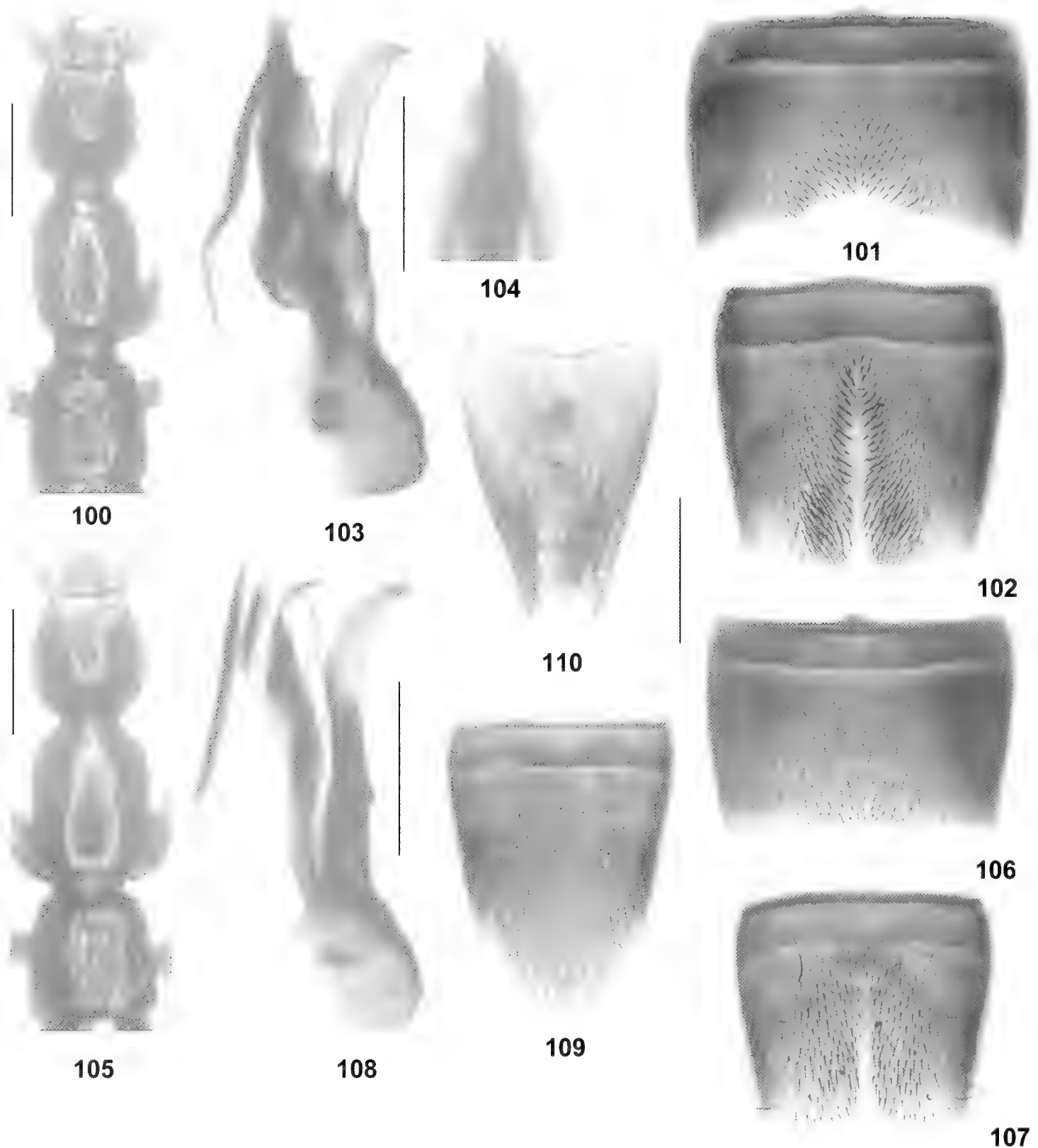
Other external characters (Fig. 100) highly similar to those of *L. biforme* and *L. lunatum*.

♂: protarsomeres I–IV strongly dilated; sternites III–VI unmodified; sternite VII (Fig. 101) strongly transverse, with shallow median impression posteriorly, this impression with moderately modified setae directed obliquely postero-mediad, posterior margin broadly concave, more distinctly concave in the middle; sternite VIII (Fig. 102) approximately as long as broad, symmetric, with rather shallow, posteriorly widened median impression, this impression narrowly without setae in the middle, on either side of middle with extensive cluster of dense black setae, posterior excision very shallow; aedeagus (Figs 103–104) 1.3 mm long; ventral process laterally compressed, subapically curved (lateral view), and apically acute; dorsal plate lamellate, apically pointed (dorsal view), and with pronounced median carina, basal portion distinct and moderately long; internal sac with dark membranous structure.

♀: unknown.



**Figs 87–99.** *Lathrobium biforme* (87–93) and *L. lunatum* (94–99). 87, 94. Forebody. 88, 95. Male sternite VII. 89, 96. Male sternite VIII. 90, 97. Aedeagus in lateral view. 91. Apical portion of aedeagus in ventral view. 92, 98. Female sternite VIII. 93. Apex of female abdomen in ventral view. 99. Female tergites IX–X. Scale bars: 87, 94: 1.0 mm; 88–93, 95–99: 0.5 mm.



**Figs 100–110.** *Lathrobium falcatum* (100–104) and *L. minicum* (105–110). **100, 105.** Forebody. **101, 106.** Male sternite VII. **102, 107.** Male sternite VIII. **103, 108.** Aedeagus in lateral view. **104.** Apical portion of aedeagus in ventral view. **109.** Female sternite VIII. **110.** Female tergites IX–X. Scale bars: 100, 105: 1.0 mm; 101–104, 106–110: 0.5 mm.

**Comparative notes.** As can be inferred from the highly similar morphology of the aedeagus, as well as from the similar modifications of the male sternites VII and VIII, *L. falcatum* is probably the adelphotaxon of *L. lunatum*,

from which it differs only by the slightly different chaetotaxy of the male sternite VII and the different morphology of the aedeagus (less strongly curved ventral process, more pronounced median carina, less distinctly pointed

apex, and longer basal portion of the dorsal plate), possibly also by the paler coloration of the legs (constant?). It is distinguished from the externally highly similar and syntopic *L. bifforme* by the shape and chaetotaxy of the male sternites VII and VIII, as well as by the completely different morphology of the aedeagus (shape of ventral process, pronounced carina of the dorsal plate).

**Distribution and natural history.** The type locality is situated in the western Qinling Shan, to the north of Chengxian (Fig. 111). The holotype was sifted from leaf litter in a secondary mixed deciduous forest at an altitude of 1760 m, together with *L. bifforme*.

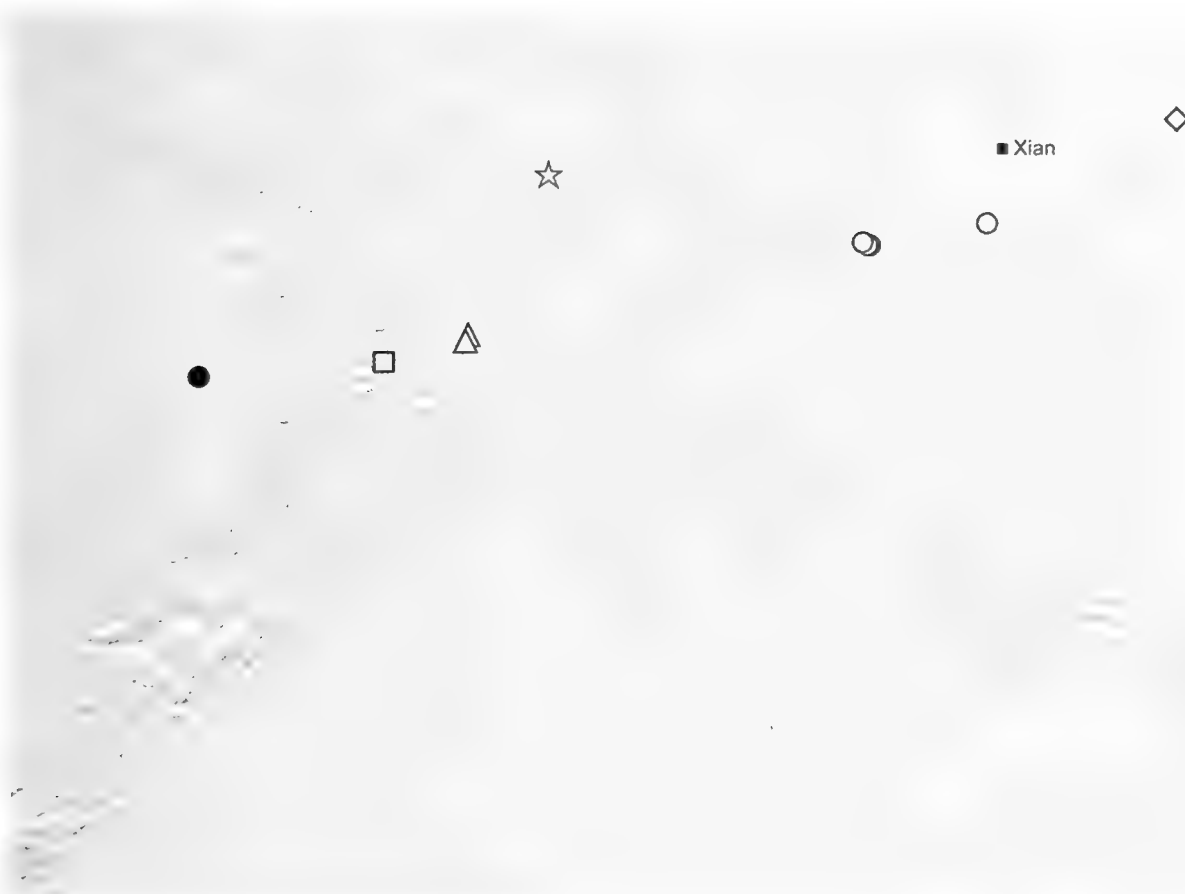
***Lathrobium minicum* sp. n.** (Figs 105–111)

**Type material.** Holotype ♂: “CHINA [16] - S-Gansu, S Longnan, Min Shan, 33°03'13"N, 104°40'57"E, 2200 m, 6.VIII.2012, V. Assing / Holotypus ♂ *Lathrobium minicum* sp. n., det. V. Assing 2012” (cAss). Paratypes: 17♂, 10♀ [2♂, 1♀ teneral]: same data as holotype (cAss); 5♂, 5♀ [1♂, 1♀ teneral]: “CHINA: S-Gansu [CH12-16], Min Shan, 45 km SW Longnan, 33°03'13"N, 104°40'57"E, 2200 m, secondary pine forest with hazelnut, moist litter and roots sifted, 6.VIII.2012, M. Schülke” (cSch, ZFMK).

**Etymology.** The specific epithet adjective) is derived from the name of the mountain where the type locality is situated.

**Description.** Size subject to weak sexual dimorphism, males on average slightly larger; body length 7.2–8.5 mm (♂), 6.7–8.2 mm (♀); length of forebody 3.3–3.8 mm (♂), 3.2–3.6 mm (♀). Coloration: body blackish; legs reddish, with the femora, particularly the profemora, often somewhat darker; antennae reddish. Forebody as in Fig. 105. Posterior margin of tergite VIII weakly convex or indistinctly, obtusely angled in the middle in both sexes. Except for the smaller average size, externally indistinguishable from *L. lunatum*.

♂: protarsomeres I–IV variably dilated, more strongly so in larger than in smaller males; sternites III–VI unmodified; sternite VII (Fig. 106) moderately strongly transverse and weakly modified, with small and shallow median impression posteriorly, this impression with few weakly modified setae posteriorly, posterior margin broadly and weakly concave, without distinct concavity in the middle; sternite VIII (Fig. 107) weakly transverse, symmetric, with rather shallow, longitudinal median impression, this impression narrowly without setae in the middle, on either side of middle with weakly defined cluster of weakly modified and not particularly dense setae, posterior excision moderately shallowly concave; aede-



**Fig. 111.** Distributions of species of the *L. lentum* group (filled symbol) and the *L. varisternale* group (open symbols): *L. lentum* (filled circle); *L. minicum* (open square); *L. inflexum* (open triangles); *L. falcatum* (open star); *L. brevitergale* (open circles); *L. huaense* (open diamond).

gus (Fig. 108) approximately 1.2 mm long; ventral process laterally compressed, subapically curved (lateral view), and apically acute; dorsal plate lamellate, apically pointed (dorsal view), and with distinct median carina apically, basal portion distinct, relatively long, and weakly sclerotized; internal sac with moderately dark membranous structures.

♀: protarsomeres I–IV distinctly dilated, similar to those of small males; sternite VIII (Fig. 109) approximately 1.1 mm long, oblong, posteriorly convexly produced; tergite IX undivided; tergite X strongly convex in cross-section, somewhat longer than tergite IX in the middle (Fig. 110); abdominal apex ventrally with weakly sclerotized amorphous sclerite.

**Comparative notes.** Among the species of the *L. varisternale* group, *L. minicum* is undoubtedly most closely related to *L. lunatum* and *L. falcatum*, as can be inferred particularly from the similar morphology of the aedeagus (shapes of ventral process, of dorsal plate, and of internal structures). It is distinguished from both of them particularly by smaller average body size, the shapes and chaetotaxy of the male sternites VII and VIII, the smaller and slightly differently shaped aedeagus (ventral process, dorsal plate), as well as by the shape of the female sternite VIII.

**Distribution and natural history.** The type locality is situated in the Min Shan to the southwest of Longnan, southern Gansu (Fig. 111). The specimens were sifted from moist leaf litter and roots in a secondary pine forest with hazelnut at an altitude of 2200 m. No other *Lathrobium* species was present at the site. Some of the paratypes are teneral.

#### *Lathrobium huaense* sp. n. (Figs 111–118)

**Type material.** Holotype ♂: “China: Shaanxi, Qin Ling Shan, 110.06 E, 34.25 N, Hua Shan Mt., S.-top, 1950–2000 m, forrest [sic], sifted, 19.08.1995, leg. M. Schülke / Holotypus ♂ *Lathrobium huaense* sp. n., det. V. Assing 2012” (cSch). Paratypes: 2♂, 3♀: same data as holotype (cSch, cAss); 2♂, 3♀ [1♂, 2♀ teneral]: same data, but “leg. A. Pütz” (cPüt, cAss); 1♂: “CHINA (Shaanxi) Qin Ling Shan 110.06E, 34.25N, Hua Shan, 118 km E Xian, S. top, 1950–2000 m, mix. wood, 19.VI.1995 Wrase” (cSch).

**Etymology.** The specific epithet (adjective) is derived from the name of the mountain (Hua Shan) where the species was discovered.

**Description.** Size subject to weakly pronounced sexual dimorphism, males on average slightly larger; body length

8.5–9.2 mm (♂), 8.2–8.8 mm (♀); length of forebody 3.7–3.9 mm (♂), 3.3–3.7 mm (♀). Coloration: body dark-brown to blackish-brown; legs reddish to dark-brown with paler tarsi; antennae reddish.

Head (Fig. 112) approximately as broad as long; punctation moderately coarse and moderately dense, sparser in median dorsal portion; interstices with very shallow, barely noticeable microreticulation. Eyes moderately small, composed of > 40 ommatidia, approximately 1/4 the length of postocular region in dorsal view, and approximately 0.3 times as long as postocular region in lateral view. Antenna 1.8–2.0 mm long.

Pronotum (Fig. 112) approximately 1.25–1.30 times as long as broad, slightly broader than head; punctation similar to that of head, but somewhat sparser; midline broadly impunctate; interstices without microsculpture.

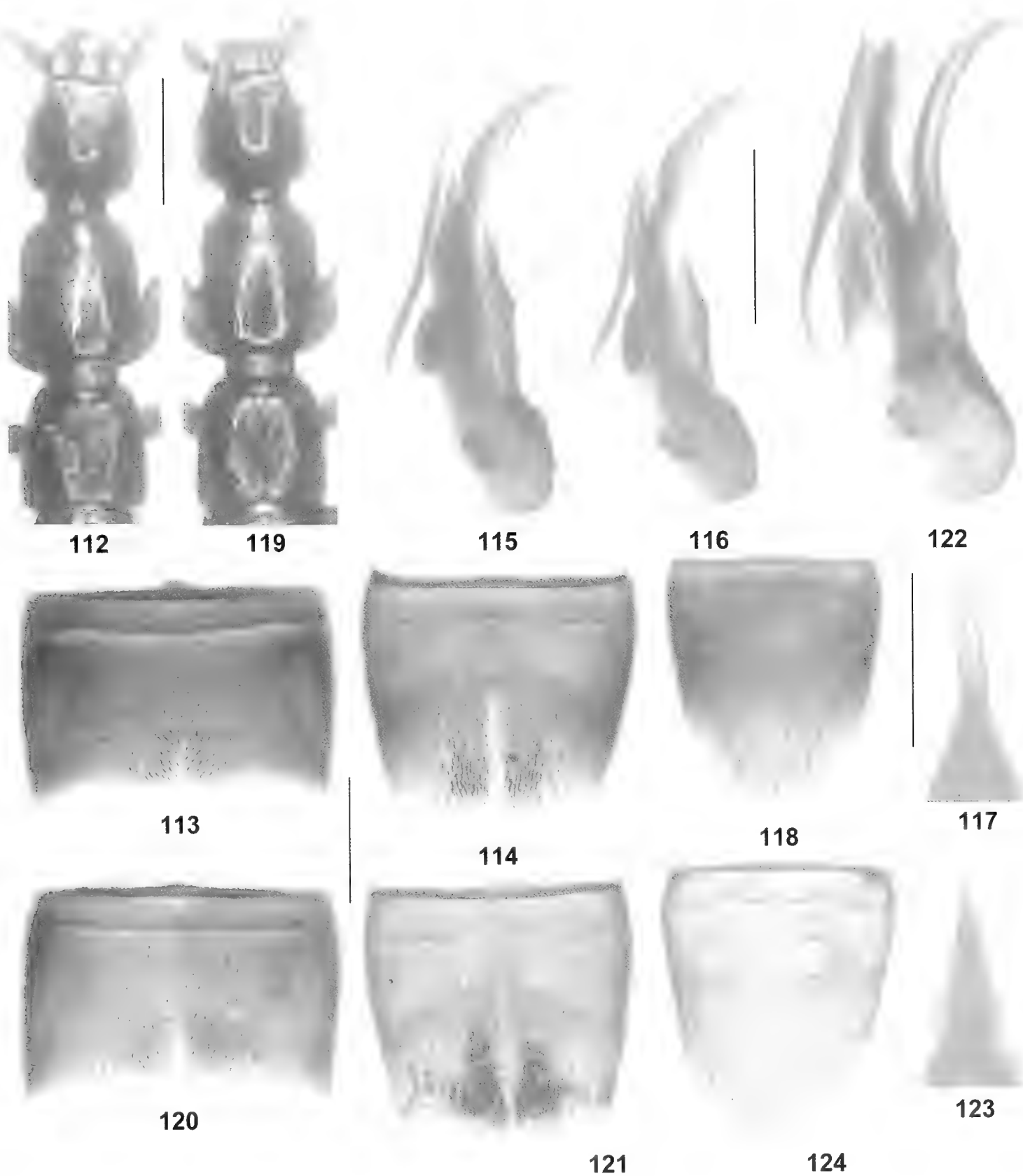
Elytra (Fig. 112) short, approximately 0.55 times as long as pronotum; punctation moderately dense and somewhat variable, shallow, weakly defined to defined; interstices without microsculpture. Hind wings completely reduced.

Abdomen with fine and dense punctation; interstices with fine, very shallow to distinct microreticulation; posterior margin of tergite VII without palisade fringe; posterior margin of tergite VIII weakly convex, without sexual dimorphism.

♂: protarsomeres I–IV strongly dilated; sternites III–VI unmodified; sternite VII (Fig. 113) with shallow median impression posteriorly, this impression with numerous moderately modified, short and stout black setae, posterior margin weakly and broadly concave; sternite VIII (Fig. 114) weakly transverse, with shallow median impression posteriorly, middle of this impression narrowly without setae, on either side of middle with cluster of dense black setae, posterior excision small, concave, and in symmetric position; aedeagus (Figs 115–117) approximately 1.25 mm long, symmetric; ventral process moderately long, rather stout, evenly arched, apically acute (lateral view), and with distinct median carina ventrally; dorsal plate long and slender, almost needle-shaped in dorsal view, without sclerotized basal portion; internal sac with dark membranous structures, but without sclerotized spines.

♀: protarsomeres I–IV distinctly dilated, but slightly less so than in male; sternite VIII (Fig. 118) approximately 1.0 mm long, oblong, posterior margin distinctly produced in the middle, middle of posterior margin truncate; tergite IX anteriorly undivided; tergite X strongly convex in cross-section, slightly longer than tergite IX in the middle.

**Comparative notes.** *Lathrobium huaense* is reliably distinguished from other species of the *L. varisternale* group distributed in the Qinling Shan only by the shape of the aedeagus (ventral process, dorsal plate), from most species also by the shape of the female sternite VIII.



**Figs 112–124.** *Lathrobium huaense* (112–118) and *L. sociabile* (119–124). 112, 119. Forebody. 113, 120. Male sternite VII. 114, 121. Male sternite VIII. 115–116, 122. Aedeagus in lateral view. 117, 123. Apical portion of aedeagus in ventral view. 118, 124. Female sternite VIII. Scale bars: 112, 119: 1.0 mm; 113–118, 120–124: 0.5 mm.

**Distribution and natural history.** The type locality is situated in the Hua Shan, eastern Qinling Shan (Fig. 111). The specimens were sifted from leaf litter in a mixed forest at an altitude of 1950–2000 m. Three paratypes are teneral.

***Lathrobium sociabile* sp. n.** (Figs 42, 119–124)

**Type material.** Holotype ♂: “China: Shaanxi, Qin Ling Shan, 108.47 E, 33.51 N, Mountain W pass at Autoroute km 70, 47 km S Xian, 2500–2600 m, sifted, 26.–27.08.1995, leg. M. Schülke / Holotypus ♂ *Lathrobium sociabile* sp. n., det. V. Assing 2012” (cSch). Paratypes: 1♂, 2♀: same data as holotype (cSch, cAss, ZFMK); 1♀: “China: Shaanxi, Qin Ling Shan, 108.47 E, 33.51 N, Mountain W pass at Autoroute km 70, 47 km S Xian, 2300–2500 m, sifted, 26.–30.08.1995, leg. M. Schülke” (cAss); 3♂, 4♀: same data, but “leg. A. Pütz” (cPüt, cAss); 1♂ [teneral], 1♀: “China (Shaanxi) Qin Ling Shan/108.47E 33.51N/Mt. W pass autoroute km 70, 47 km S Xian 2500–2600 m, 26–29.VIII.1995 Wrase” (cSch).

**Etymology.** The specific epithet (Latin, adjective: sociable) alludes to the fact that this species shares its habitat with the following species.

**Description.** Size subject to moderately pronounced sexual dimorphism, males on average slightly larger; body length 7.8–8.2 mm (♂), 6.7–8.0 mm (♀); length of forebody 3.6–3.8 mm (♂), 3.2–3.5 mm (♀). Coloration: body reddish to reddish-brown, with the abdomen sometimes darker brown; legs and antennae reddish.

Other external characters (Fig. 119) highly similar to those of *L. huaense* and allied species; reliably distinguished only by the sexual characters:

♂: sternite VII (Fig. 120) with shallow median depression posteriorly, this impression with weakly modified setae, middle of sternite narrowly without setae, posterior margin broadly concave; sternite VIII (Fig. 121) weakly transverse, with shallow median impression, middle of this impression narrowly without setae, on either side of middle with cluster of dense black setae posteriorly, posterior excision indistinct, weakly concave, and in symmetric position; aedeagus (Figs 122–123) approximately 1.4 mm long, symmetric; ventral process moderately long, rather stout, evenly arched, apically acute and indistinctly hooked (lateral view), and with distinct median carina ventrally; dorsal plate long and rather broadly lamellate, with long and fine median carina, and apically triangularly pointed; internal sac with dark membranous structures, but without sclerotized spines.

♀: sternite VIII (Fig. 124) approximately 1.15 mm long, oblong, posterior margin convexly produced in the middle; tergite IX undivided anteriorly; tergite X moderate-

ly convex in cross-section (domed), slightly longer than tergite IX in the middle.

**Comparative notes.** *Lathrobium sociabile* is distinguished from other closely related species occurring in the Qinling Shan by the sexual characters, from most species, including the syntopic *L. brevitergale*, also by the reddish coloration of the body.

**Distribution and natural history.** The species was collected in two localities in the Qinling Shan, to the south-southwest of Xi'an (Fig. 42). They were sifted from forest leaf litter at altitudes of 2300–2600 m, together with several specimens of *L. brevitergale*. One of the male paratypes is teneral.

***Lathrobium brevitergale* sp. n.** (Figs 111, 125–135)

**Type material.** Holotype ♂: “China: Shaanxi, Qin Ling Shan, 108.47 E, 33.51 N, Mountain W pass at Autoroute km 70, 47 km S Xian, 2300–2500 m, sifted, 26.–30.08.1995, leg. M. Schülke / Holotypus ♂ *Lathrobium brevitergale* sp. n., det. V. Assing 2012” (cSch). Paratypes: 2♂, 2♀: same data as holotype (cSch, cAss); 2♂, 1♀: same data as holotype, but “leg. A. Pütz” (cPüt, cAss); 2♀: “China: Shaanxi, Qin Ling Shan, 108.47 E, 33.51 N, Mountain W pass at Autoroute km 70, 47 km S Xian, 2500–2600 m, sifted, 26.–27.08.1995, leg. M. Schülke” (cSch, ZFMK); 1♂, 1♀: “CHINA: S-Shaanxi (Qinling Shan), pass on rd. Zhouzhi - Foping, 105 km SW Xi'an, N-slope, 1880 m, 33°44'N, 107°58'E, leg. M. Schülke [C01-03] / 4.VII.2001, shady rockwall base, moist (sifted) [C01-03]” (cSch, cAss); 1♂, 2♀: “CHINA Shaanxi Qinling Shan pass rd. Zhouzhi Foping 105 km SW Xi'an / N-slope 1880 m 33°44'N 107°58'E 4.VII.2001 A. Smetana [C92]” (cSme, cAss); 1♂: “China (Shaanxi) Qin Ling Shan/107.56E 33.45N, autoroute km 93 S Zhouzhi, 108 km SW Xian, mount. forest, 1650 m, 1.–2.IX.95 Wrase” (cAss); 2♂, 1♀: same data, but “leg. A. Pütz” (cPüt, cAss); 1♀: “CHINA: S-Shaanxi (Qinling Shan), pass on rd. Zhouzhi-Foping, 105 km SW Xi'an, N-slope, 1990 m, 33°44'N, 107°59'E, leg. M. Schülke [C01-01] / 2./4.VII.2001, small creek valley, mixed deciduous forest, bamboo, small meadows, dead wood, mushrooms (sifted) [C01-01]” (cAss).

**Etymology.** The specific epithet (Latin, adjective) refers to the short female tergite X, one of the characters that distinguish this species from other species of the *L. varister-nale* group.

**Description.** Size subject to moderately pronounced sexual dimorphism, males on average slightly larger; body length 8.5–9.2 mm (♂), 7.5–8.5 mm (♀); length of forebody 3.6–4.1 mm (♂), 3.4–3.7 mm (♀). Coloration: body

dark-brown to blackish-brown, with the elytra sometimes reddish-brown; legs and antennae reddish.

In external characters (Fig. 125) highly similar to those of *L. huaense* and allied species, reliably distinguished from them only by the sexual characters:

♂: sternites IV–VI with small and indistinct median impressions or depressions; sternite VII (Figs 126–127) with shallow median depression posteriorly, this depression with weakly modified setae, middle of sternite narrowly without setae, posterior margin broadly and weakly concave; sternite VIII (Fig. 128) weakly transverse, middle without setae in posterior half, with longitudinal median impression, this impression with cluster of dense black setae on either side of middle in posterior half, posterior excision very small, weakly concave, and in symmetric position; aedeagus (Figs 129–132) 1.4–1.5 mm long, symmetric; ventral process long, slender, evenly arched, and apically very acute; dorsal plate long and rather broadly lamellate, with long median carina, apically pointed in the middle, and with the relatively long basal portion forming a distinct angle with the apical portion in lateral view; internal sac with dark membranous structures, but without sclerotized spines.

♀: sternite VIII (Figs 133–135) approximately 1.2 mm long, oblong, posterior margin strongly and convexly produced in the middle; tergite IX undivided anteriorly; tergite X moderately convex in cross-section (domed), shorter than tergite IX in the middle.

**Intraspecific variation.** The shape of the aedeagus (Figs 129–131), the shape and chaetotaxy of the male sternite VII (Figs 126–127), and the shape of the female sternite VIII (Figs 133–135) are subject to some intraspecific variability.

**Comparative notes.** *Lathrobium brevitergale* is distinguished from other closely related species occurring in the Qinling Shan by the sexual characters, particularly the long and slender ventral process of the relatively large aedeagus, the shape of the dorsal plate of the aedeagus (apically pointed, basal portion relatively long and forming a distinct angle with the apical portion in lateral view), and the short female tergite X. From the syntopic *L. sociabile*, *L. tectifforme*, and *L. concameratum*, it is additionally separated as follows:

from *L. sociabile* by slightly larger size, darker coloration, less extensive clusters of dark setae on the male sternite VIII, and by the chaetotaxy of the male sternite VII (setae sparser in posterior median portion);

from *L. tectifforme* by the different chaetotaxy of the male sternite VIII (whole midline with setae; dark setae on either side of midline denser), the chaetotaxy of the male sternite VII (posterior median impression with dense setae, middle of sternite narrowly without setae), the shape of the female sternite VIII, and by the shape of the female

tergite X (in *L. tectifforme* forming a distinct angle in cross-section);

from *L. concameratum* by larger body size, darker average coloration, and the less indistinct posterior excision of the male sternite VIII, the posteriorly less conspicuously produced female sternite VIII.

**Distribution and natural history.** The species was collected in four localities in the Qinling Shan, to the south and southwest of Xi'an (Figs 111). The specimens were sifted from forest leaf litter at altitudes of 1650–2600 m, partly together with *L. sociabile*, *L. tectifforme*, and/or *L. concameratum*.

### *Lathrobium brevilobatum* sp. n. (Figs 70, 136–141)

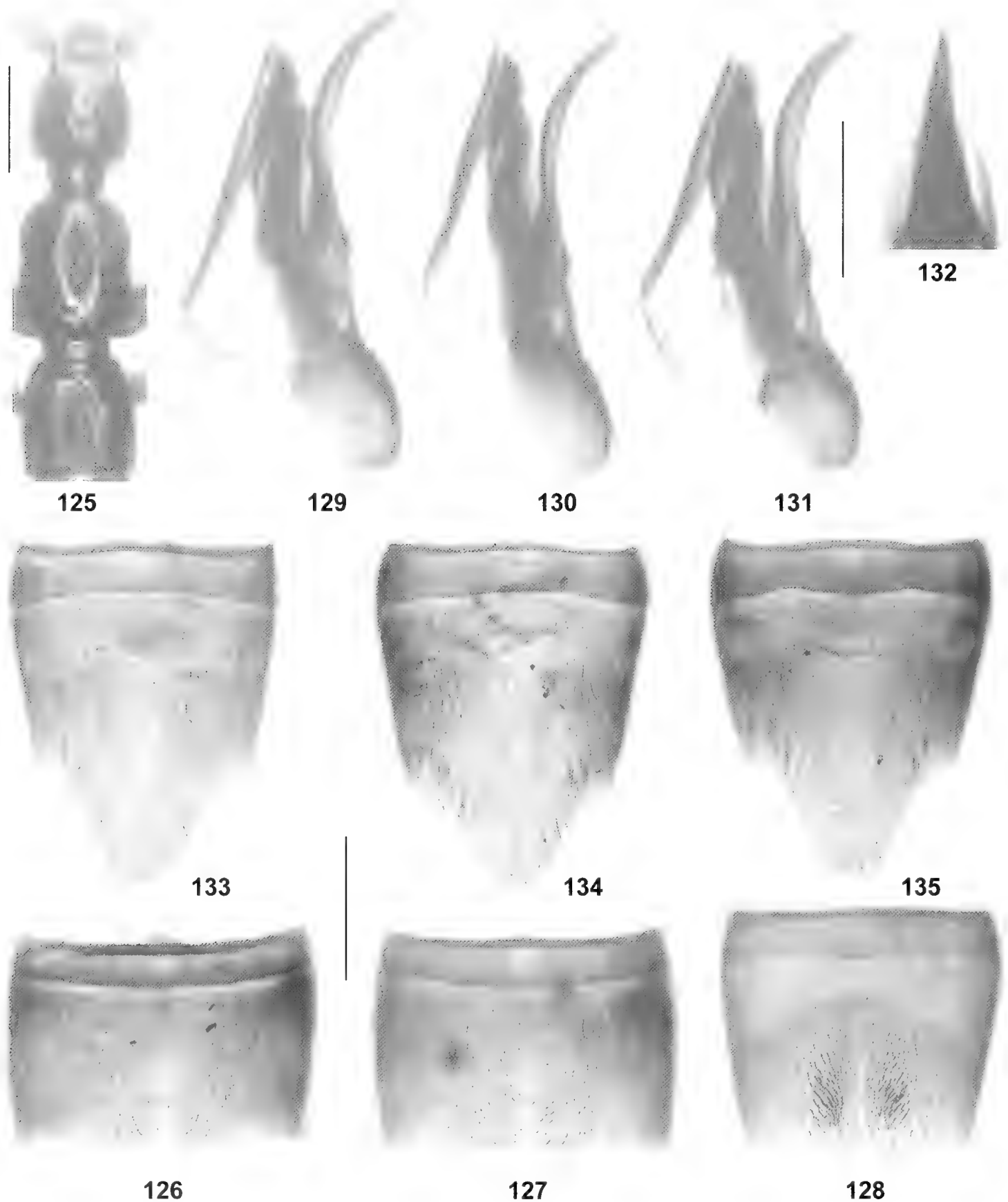
**Type material.** Holotype ♂: “China: S Shaanxi, Qinling Shan mt. range W pass on rd Xi'an Shagoujie / 45 km SSW Xi'an 33°52'N 108°46'E 2600 m 25.VII.2001 A. Smetana [C118] / Holotypus ♂ *Lathrobium brevilobatum* sp. n., det. V. Assing 2012” (cAss). Paratypes: 1♂, 3♀: same data as holotype (cSme, cAss); 1♀: “CHINA: S-Shaanxi (Qinling Shan), mountain range W pass on rd. Xi'an - Shagoujie, 45 km SSW Xi'an, 33°52'N, 108°46'E, 2675 m, leg. M. Schülke [C01-20A] / 26.VII.2001, N-slope, Abies, Betula, Larix, Rhododendron, subalpine meadows (sifted) [C01-20A]” (cAss). 1♀: same data, but 25.VII.2001, leg. Wrase (cSch).

**Etymology.** The specific epithet (Latin, adjective: with short lobe) alludes to the relative length of the ventral process of the aedeagus, one of the characters distinguishing this species from the similar *L. brevitergale*.

**Description.** Size subject to moderately pronounced sexual dimorphism, males on average slightly larger; body length 7.5–7.7 mm (♂), 6.2–7.0 mm (♀); length of forebody 3.7–3.8 mm (♂), 3.2–3.5 mm (♀). Coloration: body dark-brown to blackish-brown, with the elytra often dark-reddish; legs and antennae reddish.

Other external characters (Fig. 136) highly similar to those of *L. huaense* and allied species; reliably distinguished only by the sexual characters: Posterior margin of tergite VIII weakly convex in both sexes.

♂: sternites III–VI unmodified; sternite VII (Fig. 137) with rather extensive and shallow median impression posteriorly, middle of this impression without setae, on either side of middle with cluster of moderately modified black setae, posterior margin weakly concave; sternite VIII (Fig. 138) weakly transverse, with longitudinal impression extending along whole sternite, middle of sternite narrowly without setae, on either side of middle with relatively small cluster of moderately modified black setae, posterior excision concave, small but distinct; aedeagus (Figs



**Figs 125–135.** *Lathrobium brevitergale*. **125.** Forebody. **126–127.** Male sternite VII. **128.** Male sternite VIII. **129–131.** Aedeagus in lateral view. **132.** Apical portion of aedeagus in ventral view. **133–135.** Female sternite VIII. Scale bars: 125: 1.0 mm; 126–135: 0.5 mm.

139–140) approximately 1.25 mm long; ventral process weakly asymmetric in ventral view, moderately long, gently curved, and apically acute in lateral view; dorsal plate long and rather broadly lamellate, with long median carina, and apically sharply pointed in dorsal view, basal portion weakly sclerotized, forming a very obtuse angle with apical portion; internal sac with dark membranous structures, but without sclerotized spines.

♀: sternite VIII (Fig. 141) approximately 1.1 mm long, oblong, posterior margin distinctly and convexly produced in the middle; tergite IX undivided anteriorly; tergite X weakly convex in cross-section, slightly shorter than tergite IX in the middle.

**Comparative notes.** Among the species of the *L. vari-sternale* group, *L. brevilobatum* is most similar to *L. brevitergale*, but distinguished by the shape and chaetotaxy of the male sternite VII (more transverse, posterior margin more weakly concave, middle less narrowly without setae, setae of posterior clusters more distinctly modified), the shape and chaetotaxy of the male sternite VIII (median impression more pronounced, posterior excision more distinct, middle less narrowly without setae, setae of posterior clusters more distinctly modified), the larger aedeagus with a relatively shorter, less strongly curved, and apically less slender ventral process, the shape of the female sternite VIII (slightly shorter, posteriorly less strongly and more broadly produced), and by the relatively longer female tergite X (in relation to tergite IX).

**Distribution and natural history.** The type locality is situated in the Qinling Shan, to the south-southwest of Xi'an (Fig. 70), at an altitude of 2600–2675 m. The specimens were sifted from leaf litter in a subalpine mixed forest composed of fir, larch, birch, and rhododendron.

#### *Lathrobium concameratum* sp. n. (Figs 42, 142–147)

**Type material.** Holotype ♂: “CHINA: S-Shaanxi (Qinling Shan), pass on rd. Zhouzhi-Foping, 105 km SW Xi'an, N-slope, 1990 m, 33°44'N, 107°59'E, leg. M. Schülke [C01-01] / 2./4.VII.2001, small creek valley, mixed deciduous forest, bamboo, small meadows, dead wood, mushrooms (sifted) [C01-01] / Holotypus ♂ *Lathrobium concameratum* sp. n., det. V. Assing 2012” (cSch). Paratypes: 1♂, 3♀: same data as holotype (cSch, cAss, ZFMK); 1♂: “CHINA (S-Shaanxi) Qinling Shan, pass on rd. Zhouzhi-Foping, 105 km SW Xi'an, N-slope, 1990 m, 33°44'N, 107°59'E (small creek vall./mix. decid. for./bamboo/small meadows, 2./4.VII.2001 Wrase [01]” (cSch); 1♀: “China (Shaanxi) Qin Ling Shan/107.56E 33.45N, autoroute km 93 S Zhouzhi, 108 km SW Xian, mount. forest, 1650 m, 1.–2.IX.95 Wrase” (cSch); 1♂, 1♀: “CHINA Shaanxi Qinling Shan pass rd. Zhouzhi Foping 105

km SW Xi'an / N-slope 1990 m 33°44'N 107°59'E 2.VII.2001 A. Smetana [C89]” (cSme, cAss); 1♀: “CHINA [1] - S-Shaanxi, SW Zhouzhi, Qinling Shan, 33°44'02"N, 107°58'06"E, 1900 m, 25.VII.2012, V. Assing” (cAss); 2♀: “CHINA (S-Shaanxi) Qinling Shan, 52 km SSW Zhouzhi, 1900 m, 33°44'02"N, 107°58'06"E (NE.slope, creek valley, mixed forest, litter and soil sifted, under gravel) 25.VII.2012, D.W. Wrase [01]” (cSch).

**Etymology.** The specific epithet (Latin, adjective: arched) refers to the convex (cross-section) female tergite X, one of the characters separating this species from the syntopic *L. tectiforme*.

**Description.** Size subject to moderately pronounced sexual dimorphism, males slightly larger; body length 7.0–7.6 mm (♂), 6.0–6.7 mm (♀); length of forebody 3.2–3.4 mm (♂), 2.9–3.2 mm (♀). Coloration: body dark-reddish to blackish-brown; legs and antennae reddish.

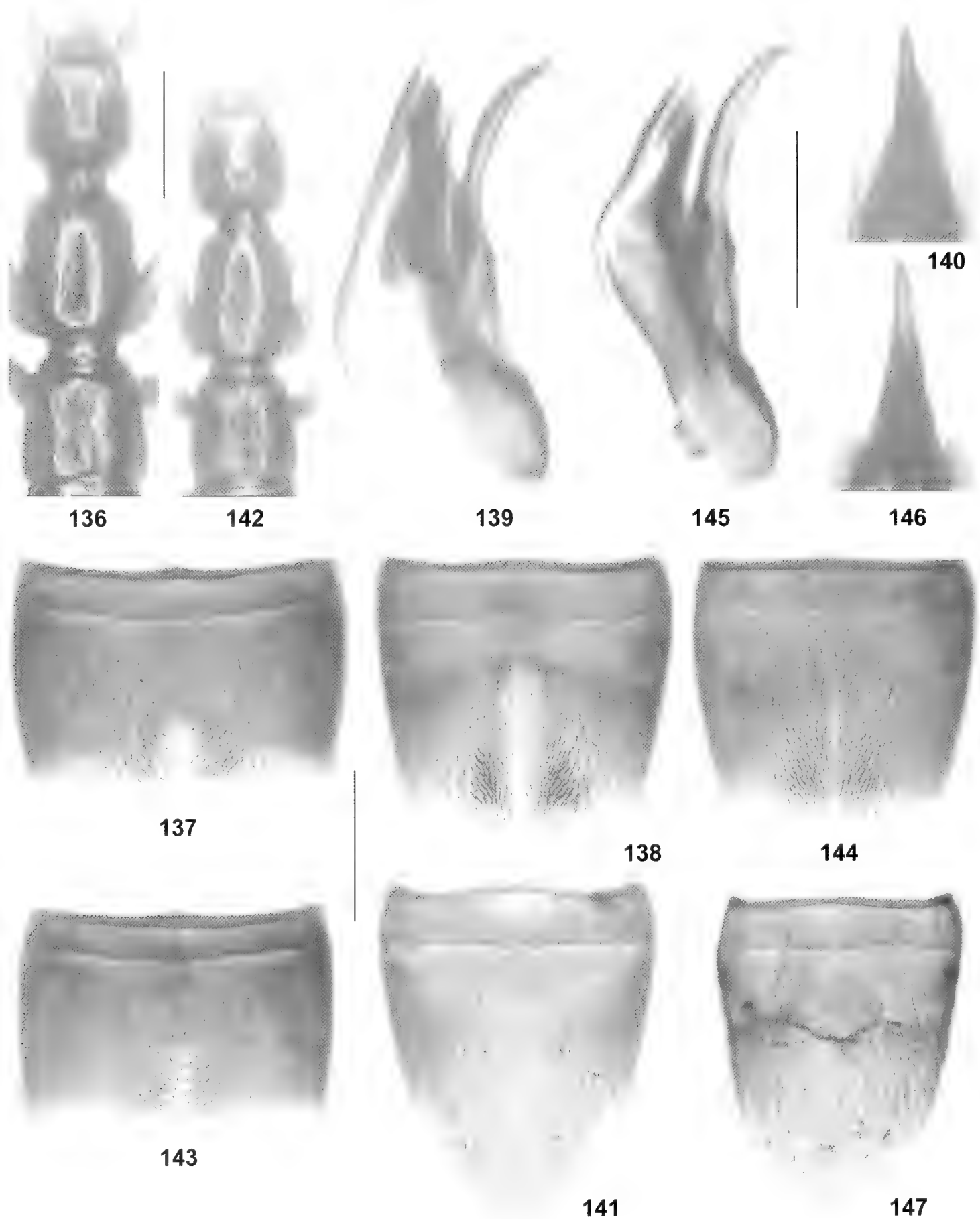
In external characters (Fig. 142) highly similar to those of *L. huaense* and allied species; reliably distinguished from the closely related species only by the sexual characters.

Tergite VIII with weakly pronounced sexual dimorphism.

♂: tergite VIII with weakly convex posterior margin; sternites III–VI unmodified; sternite VII (Fig. 143) with shallow median impression, this impression with weakly modified setae, middle of sternite narrowly without setae, posterior margin broadly and weakly concave; sternite VIII (Fig. 144) weakly transverse, with long median impression, middle of this impression narrowly without setae, on either side of middle with cluster of dense black setae posteriorly, posterior excision indistinct, sometimes practically obsolete; aedeagus (Figs 145–146) approximately 1.3 mm long, symmetric; ventral process moderately long, moderately slender, evenly arched in lateral view, and apically acute; dorsal plate moderately long and broadly lamellate, with median carina apically, with apex of triangular shape in dorsal view, and with moderately long, weakly sclerotized basal portion; internal sac with dark membranous structures, but without sclerotized spines.

♀: posterior margin of tergite VIII truncate to indistinctly concave; sternite VIII (Fig. 147) approximately 1.0 mm long, oblong, posterior margin convexly produced in the middle; tergite IX undivided anteriorly; tergite X convex in cross-section (domed), approximately as long as tergite IX in the middle, or slightly shorter.

**Comparative notes.** *Lathrobium concameratum* is distinguished from other closely related species occurring in the Qinling Shan by its relatively small size and especially by the sexual characters, particularly the practically obsolete posterior excision of the male sternite VIII, the shapes of



**Figs 136–147.** *Lathrobium brevilobatum* (136–141) and *L. concameratum* (142–147). **136, 142.** Forebody. **137, 143.** Male sternite VII. **138, 144.** Male sternite VIII. **139, 145.** Aedeagus in lateral view. **140, 146.** Apical portion of aedeagus in ventral view. **141, 147.** Female sternite VIII. Scale bars: 136, 142: 1.0 mm; 137–141, 143–147: 0.5 mm.

the ventral process and the dorsal plate of the aedeagus, and the shape of the female sternite VIII. From the syntopic *L. brevitergale* and *L. tectifforme*, it is additionally separated as follows:

from *L. brevitergale* by the stouter setae in the shallower and more extensive posterior impression of the male sternite VII, the smaller aedeagus and by the greater relative length of the female tergite X;

from *L. tectifforme* by the on average paler coloration, the presence of dense dark setae in the posterior impression of the male sternite VII, the absence of setae along the middle of the male sternite VII, the more weakly concave posterior margin of the male sternite VII, the absence of setae along the whole middle of the male sternite VIII, the differently shaped female sternite VIII, and by the convex female tergite X (cross-section).

**Distribution and natural history.** *Lathrobium concameratum* is known from two localities in the Qinling Shan, to the southwest of Xi'an (Fig. 42). The specimens were sifted from leaf litter in deciduous forests at altitudes of 1650 and 1990 m, together with *L. brevitergale* and *L. tectifforme*.

***Lathrobium tectifforme* sp. n.** (Figs 148–156, 169)

**Type material.** Holotype ♂: “China: Shaanxi, Qin Ling Shan, 107.56 E, 33.45 N, Autoroute km 93 S of Zhouzhi, 108 km SW Xian, Mountain Forrest [sic], sifted, 1650 m, 1.–2.09.1995, leg. M. Schülke / Holotypus ♂ *Lathrobium tectifforme* sp. n., det. V. Assing 2012” (cSch). Paratypes: 3♂, 2♀: same data as holotype (cSch, cAss); 5♂, 4♀ [1♂, 1♀ teneral]: same data as holotype, but “leg. A. Pütz” (cPüt, cAss) 1♂, 2♀: “China (Shaanxi) Qin Ling Shan/107.56E 33.45N, autoroute km 93 S Zhouzhi, 108 km SW Xian, mount. forest, 1650 m, 1.–2.IX.95 Wrase” (cSch, cAss); 1♀: “CHINA: S-Shaanxi (Qinling Shan), river bank above Houzhenzi, 115 km WSW Xi'an, 1450 m, 33°50'N, 107°47'E, leg. M. Schülke [C01-06] / 5.VII.2001, gravel bank (floating), mixed deciduous forest, moss, mushrooms (sifted) [C01-06] (cSch); 1♀: “China Shaanxi Qinling Shan above Houzhenzi 115 km WSW Xi'an / 1450 m, 33°50'N 107°47'E 5.VII.2001 A. Smetana [C95b]” (cSme); 2♀: “CHINA: S-Shaanxi (Qinling Shan), pass on rd. Zhouzhi-Foping, 105 km SW Xi'an, N-slope, 1700 m, 33°46'N, 107°58'E, leg. M. Schülke [C01-02] / 3.VII.2001, small creek valley, mixed deciduous forest, moss (sifted) [C01-02]” (cSch); 4♂, 4♀: “CHINA: S-Shaanxi (Qinling Shan), pass on rd. Zhouzhi-Foping, 105 km SW Xi'an, N-slope, 1990 m, 33°44'N, 107°59'E, leg. M. Schülke [C01-01] / 2./4.VII.2001, small creek valley, mixed deciduous forest, bamboo, small meadows, dead wood, mushrooms (sifted) [C01-01]” (cSch, cAss, ZFMK); 2♂: “CHINA (S-Shaanxi) Qinling

Shan, pass on rd. Zhouzhi-Foping, 105 km SW Xi'an, N-slope, 1990 m, 33°44'N, 107°59'E (small creek vall./mix. decid. for./bamboo/small meadows, 2./4.VII.2001 Wrase [01]” (cSch); 1♂: “CHINA: S-Shaanxi (Qinling Shan), pass on rd. Zhouzhi - Foping, 105 km SW Xi'an, N-slope, 1880 m, 33°44'N, 107°58'E, leg. M. Schülke [C01-03] / 4.VII.2001, shady rockwall base, moss (sifted) [C01-03]” (cAss); 1♂: “China: Shaanxi 1999, Foping Nat. Res., Panda area, 1600 m, 33°45'N, 107°48'E, 6.–11.4, Sinaiev & Plutenko” (cAss); 2♀: “CHINA Shaanxi Qinling Shan pass rd. Zhouzhi Foping 105 km SW Xi'an / N-slope 1880 m 33°44'N 107°58'E 4.VII.2001 A. Smetana [C92]” (cSme, cAss); 2♂, 2♀: “CHINA Shaanxi Qinling Shan pass rd. Zhouzhi Foping 105 km SW Xi'an / N-slope 1990 m 33°44'N 107°59'E 2.VII.2001 A. Smetana [C89]” (cSme, cAss).

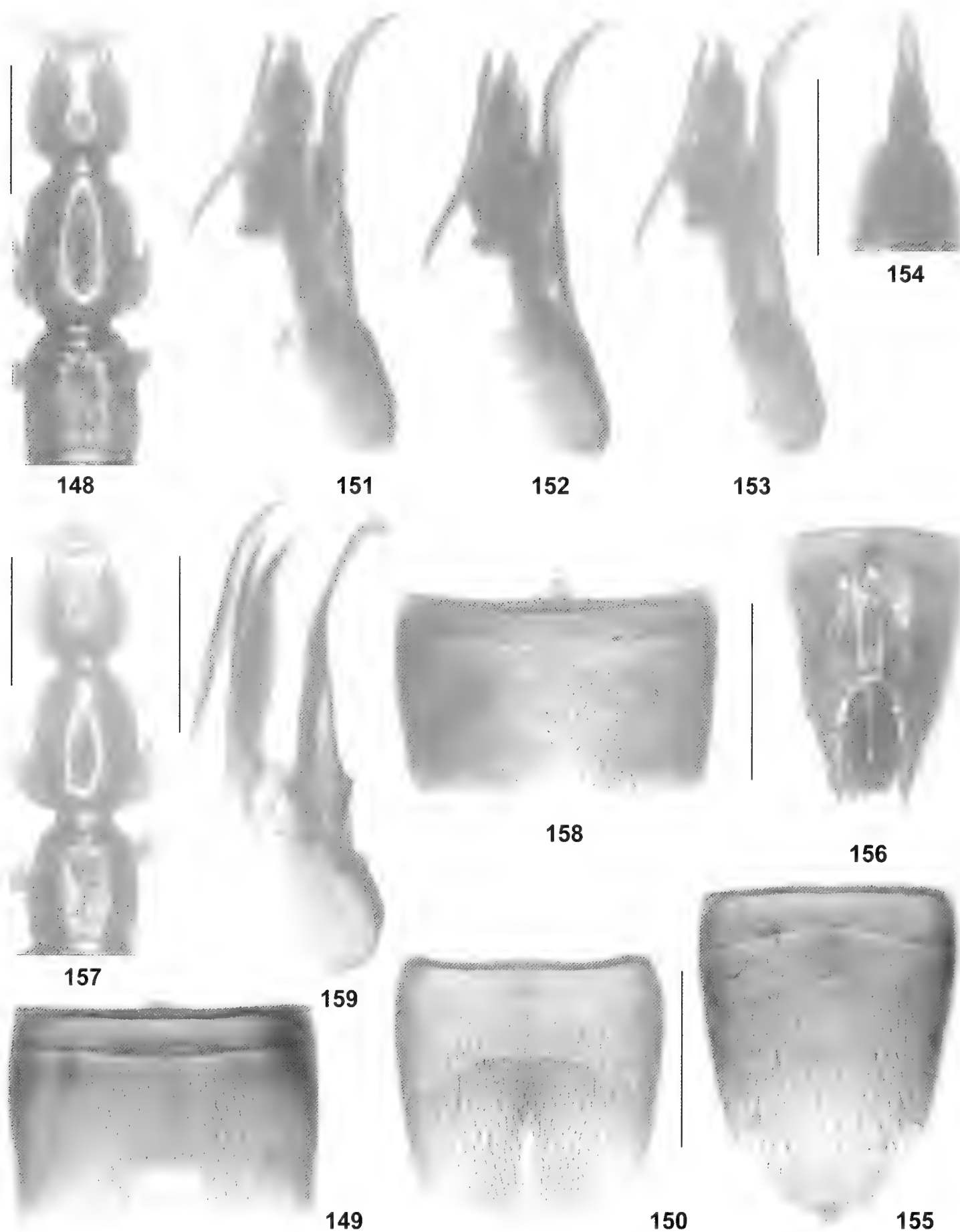
**Etymology.** The specific epithet (Latin, adjective: shaped like a roof) alludes to the shape of the female tergite X.

**Description.** Size subject to moderately pronounced sexual dimorphism, males on average slightly larger; body length 7.1–8.2 mm (♂), 6.5–7.8 mm (♀); length of forebody 3.2–3.6 mm (♂), 3.0–3.4 mm (♀). Coloration: body reddish-brown to blackish-brown, with the elytra often dark-reddish to reddish-brown; legs and antennae reddish.

Other external characters (Fig. 148) highly similar to those of *L. huaense* and allied species; reliably distinguished only by the sexual characters:

♂: posterior margin of tergite VIII weakly convex; sternites III–VI unmodified; sternite VII (Fig. 149) with rather small median depression posteriorly, this impression almost without setae, middle of sternite with setae, posterior margin noticeably concave, particularly in the middle; sternite VIII (Fig. 150) weakly transverse, with longitudinal median impression only in posterior half, middle of this impression narrowly without setae only in posterior half, on either side of middle with rather ill-delimited and not particularly dense cluster of black setae posteriorly, posterior excision small but distinct, concave, and in symmetric position; aedeagus (Figs 151–154) approximately 1.2 mm long, symmetric; ventral process moderately long, subapically abruptly curved and apically very acute in lateral view, and with distinct median carina ventrally; dorsal plate long and rather broadly lamellate, with long median carina, and apically convex, basal portion short and not forming an angle with apical portion; internal sac with dark membranous structures, but without sclerotized spines.

♀: posterior margin of tergite VIII weakly concave; sternite VIII (Fig. 155) approximately 1.0 mm long, oblong, posterior margin triangularly produced in the middle; tergite IX undivided anteriorly; tergite X roof-shaped, angled in cross-section, slightly shorter than tergite IX in the middle (Fig. 156).



**Figs 148–159.** *Lathrobium tectiforme* (148–156) and *L. inflexum* (157–159). 148, 157. Forebody. 149, 158. Male sternite VII. 150. Male sternite VIII. 151–153, 159. Aedeagus in lateral view. 154. Apical portion of aedeagus in ventral view. 155. Female sternite VIII. 156. Female tergites IX–X. Scale bars: 148, 157: 1.0 mm; 149–156, 158–159: 0.5 mm.

**Comparative notes.** *Lathrobium tectifforme* is distinguished from other closely related species from the Qinling Shan by the sexual characters, particularly the sexually dimorphic tergite VIII (posterior margin weakly concave in female), the shape and chaetotaxy of the male sternite VII (with setae along the middle, posterior impression small, well-delimited, and practically without setae), the chaetotaxy of the male sternite VIII (midline without setae only in posterior half, clusters of black setae ill-delimited and not very dense), the shape of the ventral process (subapically sharply curved, apically very acute) and the dorsal plate of the aedeagus, the shape of the female sternite VIII, as well as by the roof-shaped and short (in relation to tergite IX) tergite X. For additional characters separating *L. tectifforme* from the syntopic *L. concameratum* and *L. brevitergale* see the comparative notes in the respective species sections.

**Distribution and natural history.** *Lathrobium tectifforme* was collected in several localities in the Qinling Shan to the south-southwest of Xi'an (Fig. 169). The specimens were sifted from the leaf litter of mixed deciduous forests at altitudes of 1450–1990 m, together with *L. brevitergale* and *L. concameratum*.

***Lathrobium inflexum* sp. n.** (Figs 111, 157–162)

**Type material.** Holotype ♂: "CHINA [7] - S-Gansu, mountains SE Longnan, sifted, 33°13'20"N, 105°15'10"E, 2170 m, 31.VII.2012, V. Assing / Holotypus ♂ *Lathrobium inflexum* sp. n., det. V. Assing 2012" (cAss). Paratypes: 10♂, 16♀: same data as holotype (cAss, MNHUB); 11♂, 8♀: "CHINA: S-Gansu [CH12-07], Mts. 36 km SE Longnan, 33°13'20"N, 105°15'10"E, 2170 m, N-slope with shrubs and scattered coniferous trees, litter & mushrooms sifted, 31.VII.2012, leg. M. Schülke" (cSch); 6♂, 2♀: "CHINA [8] - S-Gansu, mountains SE Longnan, sifted, 33°11'20"N, 105°14'24"E, 2030 m, 31.VII.2012, V. Assing" (cAss, MNHUB); 6♂, 2♀ [1♂ teneral]: "CHINA: S-Gansu [CH12-08], Mts. 38 km SE Longnan, 33°11'20"N, 105°14'24"E, 2030 m, N-slope with scree, moss, fern roots and litter sifted, 31.VII.2012, leg. M. Schülke" (cSch); 11♂, 21♀: "CHINA [13] - S-Gansu, mountains SE Longnan, sifted, 33°13'03"N, 105°14'55"E, 2080 m, 4.VIII.2012, V. Assing" (cAss, MNHUB); 3♂, 6♀: "CHINA: S-Gansu [CH12-13], Mts. 36 km SE Longnan, 33°13'03"N, 105°14'55"E, 2080 m, N-slope with mixed pine and birch forest, litter and mushrooms sifted, 4.VIII.2012, leg. M. Schülke" (cSch); 1♀: same data, but "[CH12-13b] ... litter sifted" (cSch); 3♂, 4♀: "CHINA [18] - S-Gansu, mountains SE Longnan, sifted, 33°11'17"N, 105°14'12"E, 2060 m, 7.VIII.2012, V. Assing" (cAss, MNHUB); 3♀ [1 teneral]: "CHINA [18a] - S-Gansu, mts. SE Longnan, nest of *Formica*, 33°11'17"N,

105°14'12"E, 2060 m, 7.VIII.2012, V. Assing" (cAss, MNHUB); 3♂, 2♀ [1♀ teneral]: "CHINA [18b] - S-Gansu, mountains SE Longnan, sifted, 33°11'16"N, 105°14'08"E, 2130 m, 7.VIII.2012, V. Assing" (cAss); 4♂, 1♀: "CHINA (S.Gansu) Mts. 38 km SE Longnan, 2060 m, 33°11'17"N, 105°14'12"E, (W-slope with scree, scrubs, tall herbaceous vegetation, roots, soil, moss sifted) 7.VIII.2012 D.W. Wrase [18] " (cSch, ZFMK).

**Etymology.** The specific epithet (Latin, participle of inflectere: to inflect) alludes to the apically inflected ventral process of the aedeagus.

**Description.** Size without sexual dimorphism; body length 5.8–7.5 mm; length of forebody 3.0–3.5 mm. Coloration: forebody reddish-brown to dark-brown; abdomen dark-brown to blackish-brown; legs and antennae reddish.

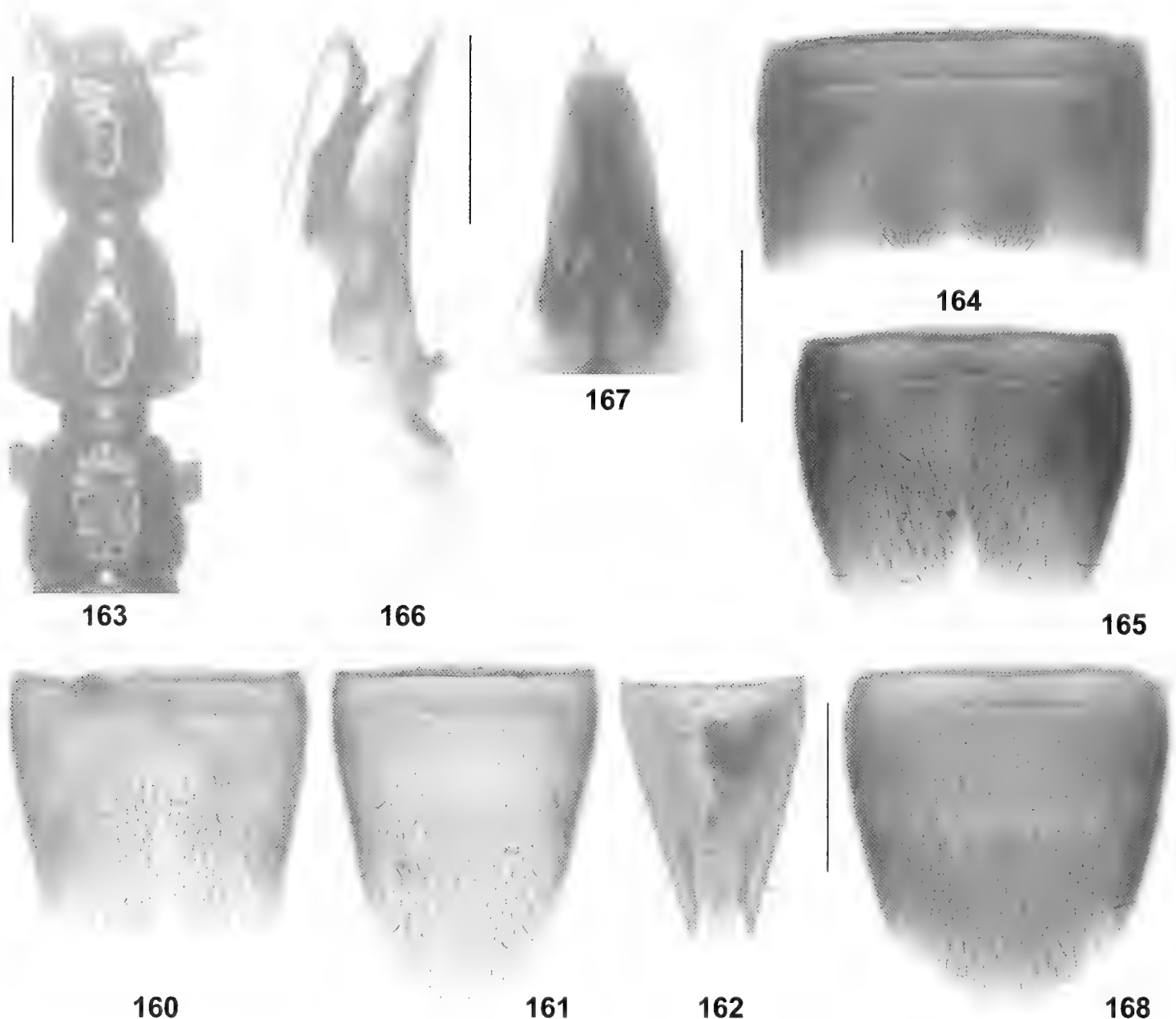
Head (Fig. 157) oblong, approximately 1.05–1.10 times as long as broad; punctation moderately coarse and moderately dense, somewhat sparser in median dorsal portion; interstices on average slightly broader than punctures, with fine, but distinct microreticulation and subdued shine. Eyes moderately small, composed of approximately 40 ommatidia, approximately 1/4 the length of postocular region in dorsal view, and approximately 0.35 times as long as postocular region in lateral view. Antenna 1.6–1.9 mm long.

Pronotum (Fig. 157) slender, approximately 1.3 times as long as broad and 1.05–1.10 times as broad as head; lateral margins parallel; punctation similar to that of head; midline broadly impunctate; interstices without microsculpture and glossy.

Elytra (Fig. 157) short, 0.5–0.6 times as long as pronotum; punctation moderately dense and rather shallow, defined to ill-defined; interstices without microsculpture. Hind wings completely reduced.

Abdomen with fine and rather dense punctation, punctures on tergite VII slightly sparser than on tergites III–VI; interstices with very fine and shallow microsculpture; posterior margin of tergite VII without palisade fringe; tergite VIII without apparent sexual dimorphism, posterior margin weakly convex in both sexes.

♂: protasomeres I–IV strongly dilated; sternites III–VI unmodified; sternite VII (Fig. 158) strongly transverse, with distinct but shallow median impression posteriorly, this impression with not particularly dense and weakly modified setae, posterior margin moderately concave in the middle; sternite VIII (Fig. 160) weakly transverse, with shallow oblong median impression with weakly modified setae; posterior excision shallow; aedeagus (Fig. 159) approximately 1.3 mm long and slender; ventral process long and slender, apically hook-shaped in lateral view; dorsal plate lamellate and moderately sclerotized, without separate basal portion, without distinct median carina, and apically pointed in dorsal view; internal sac with long and



**Figs 160–168.** *Lathrobium inflexum* (160–162) and *L. lentum* (163–168). 160, 165. Male sternite VIII. 161, 168. Female sternite VIII. 162. Female tergites IX–X. 163. Forebody; 164. Male sternite VII. 166. Aedeagus in lateral view. 167. Apical portion of aedeagus in ventral view. Scale bars: 163: 1.0 mm; 160–162, 164–168: 0.5 mm.

moderately dark membranous structures, without sclerotized spines.

♀: protarsomeres I–IV dilated, but distinctly less so than in male; sternite VIII (Fig. 161) approximately 1.0 mm long, distinctly oblong, and convexly produced posteriorly; tergite IX anteriorly undivided; tergite X weakly convex in cross-section, slightly shorter than tergite IX in the middle (Fig. 162).

**Comparative notes.** *Lathrobium inflexum* lacks conspicuous external characters separating it from other species of moderate size and with a slender pronotum. It is characterized particularly by the male primarily and secondary sexual characters, above all by the shape of the ven-

tral process of the aedeagus. Based on the similar male and female sexual characters, the species is tentatively attributed to the *L. varisternale* group, although it is not subject to a sexual dimorphism of body size, one of the synapomorphies constituting this group.

**Distribution and natural history.** The species was found in several geographically close localities in the mountain range to the southeast of Longnan, southern Gansu (Fig. 111). It was sifted in great numbers from moss, fern roots, and leaf litter in mixed forests and beneath shrubs at an altitude of 2030–2170 m, in one locality together with an undescribed species represented by a single female. Three specimens are teneral.

## The *Lathrobium lentum* species group

### *Lathrobium lentum* sp. n. (Figs 111, 163–168)

**Type material.** Holotype ♂: “CHINA [24]- N-Sichuan, pass NW Songpan, 3600 m, 32°55'32"N, 103°25'56"E, sifted, 11.VIII.2012, V. Assing / Holotypus ♂ *Lathrobium lentum* sp. n., det. V. Assing 2012” (cAss). Paratypes: 12♂, 19♀: same data as holotype (cAss); 7♂, 11♀: “CHINA: N-Sichuan [CH12-24], pass 35 km NNW Songpan, 32°55'32"N, 103°25'56"E, 3600 m, moist N-slope with *Salix* and other shrubs, litter, grass roots & moss sifted, 11.VIII.2012, leg. M. Schülke” (cSch, ZFMK); 5♂, 6♀: “CHINA (N-Sichuan) pass 35 km NNW Songpan 32°55'32"N, 103°25'56"E, 3600 m, (moist N-slope with *Salix*, other shrubs, litter, moss, soil sifted, 11.VIII.2012, D.W. Wrase [24]” (cSch, cAss).

**Etymology.** The specific epithet (Latin, adjective: slow) alludes to the short legs, particularly the short tarsi, suggesting that the species moves slowly.

**Description.** Size subject to weakly pronounced sexual dimorphism, males on average slightly larger; body length 6.8–8.0 mm (♂), 5.8–7.0 mm (♀); length of forebody 3.0–3.4 mm (♂), 2.8–3.2 mm (♀). Coloration: body blackish; legs dark-brown with paler tarsi; antennae reddish.

Head (Fig. 163) weakly oblong, approximately 1.05 times as long as broad; posterior angles weakly marked, practically obsolete; punctation rather coarse and relatively sparse, particularly in median dorsal portion; interstices without microsculpture and glossy. Eyes relatively large, composed of > 50 weakly defined ommatidia, approximately 1/3 the length of postocular region in dorsal view, or nearly so. Antenna 1.5–1.8 mm long.

Pronotum (Fig. 163) relatively short and broad, approximately 1.2 times as long as broad and 1.1 times as broad as head; punctation sparse; midline broadly impunctate; interstices without microsculpture.

Elytra (Fig. 163) rather broad and moderately short, approximately 0.6 times as long as pronotum; punctation sparse, rather fine, and shallow; interstices without microsculpture. Hind wings completely reduced. Legs, particularly the tarsi very short; length of metatarsus approximately 0.6 times the width of pronotum. Protarsomeres I–IV with weakly pronounced sexual dimorphism.

Abdomen with fine and dense punctation, punctures only slightly sparser on tergite VII than on tergites III–VI; interstices with fine and distinct microreticulation; posterior margin of tergite VII without palisade fringe; posterior margin of tergite VIII weakly convex, without evident sexual dimorphism.

♂: protarsomeres I–IV moderately to strongly dilated; sternites III–VI unmodified; sternite VII (Fig. 164)

strongly transverse, with rather extensive median depression, this depression with two large clusters of moderately modified long black setae on either side of the narrowly non-pubescent middle, posterior margin broadly and weakly concave; sternite VIII (Fig. 165) distinctly transverse, with shallow and oblong median impression with unmodified setae, middle of sternite narrowly without setae, posterior excision broad and shallow; aedeagus (Figs 166–167) approximately 1.5 mm long and symmetric; ventral process slender, with distinct and long median carina, and apically acute; dorsal plate lamellate, thin, apically acute, and without distinct basal portion; internal sac with oblong dark membranous structures, without sclerotized spines.

♀: protarsomeres I–IV distinctly dilated, but usually at least slightly less so than in male; sternite VIII (Fig. 168) approximately 1.0 mm long, approximately as long as broad, and with convex posterior margin; tergite IX completely divided anteriorly; tergite X broad, weakly convex in cross-section, anteriorly reaching anterior margin of tergite IX.

**Comparative notes.** Based on the external and sexual characters, *L. lentum* does not appear to be closely affiliated with any of the other species of the study region. It differs from all of them by the absence of microsculpture on the head, the broad pronotum in relation to the slender head, the short legs, particularly the short tarsi, the chaetotaxy of the male sternite VII, the shape and chaetotaxy of the male sternite VIII, the morphology of the aedeagus (ventral process symmetric and ventrally carinate; dorsal plate without distinct basal portion), and by the shape of the female sternite VIII. The latter differs from that of *L. brevisternale*, the only other species from the study region whose female sternite VIII is not oblong, by the distinctly convex posterior margin. In addition, *L. lentum* is characterized by the blackish coloration of the body, the broad elytra, the rather sparse punctation of the forebody, and the completely divided female tergite IX. The only species that show some similarities are the species of the *L. varisternale* group, which often have the male sternite VIII weakly modified and narrowly without setae in the middle and a symmetric aedeagus with a slender ventral process and only with membranous internal structures.

**Distribution and natural history.** The type locality is situated to the northwest of Songpan, northern Sichuan (Fig. 111). The specimens were sifted from grass roots, leaf litter, and moss on a moist north slope with *Salix* sp. and other shrubs at an altitude of 3600 m, together with *L. det truncatum* and numerous specimens of *L. biapicale*.



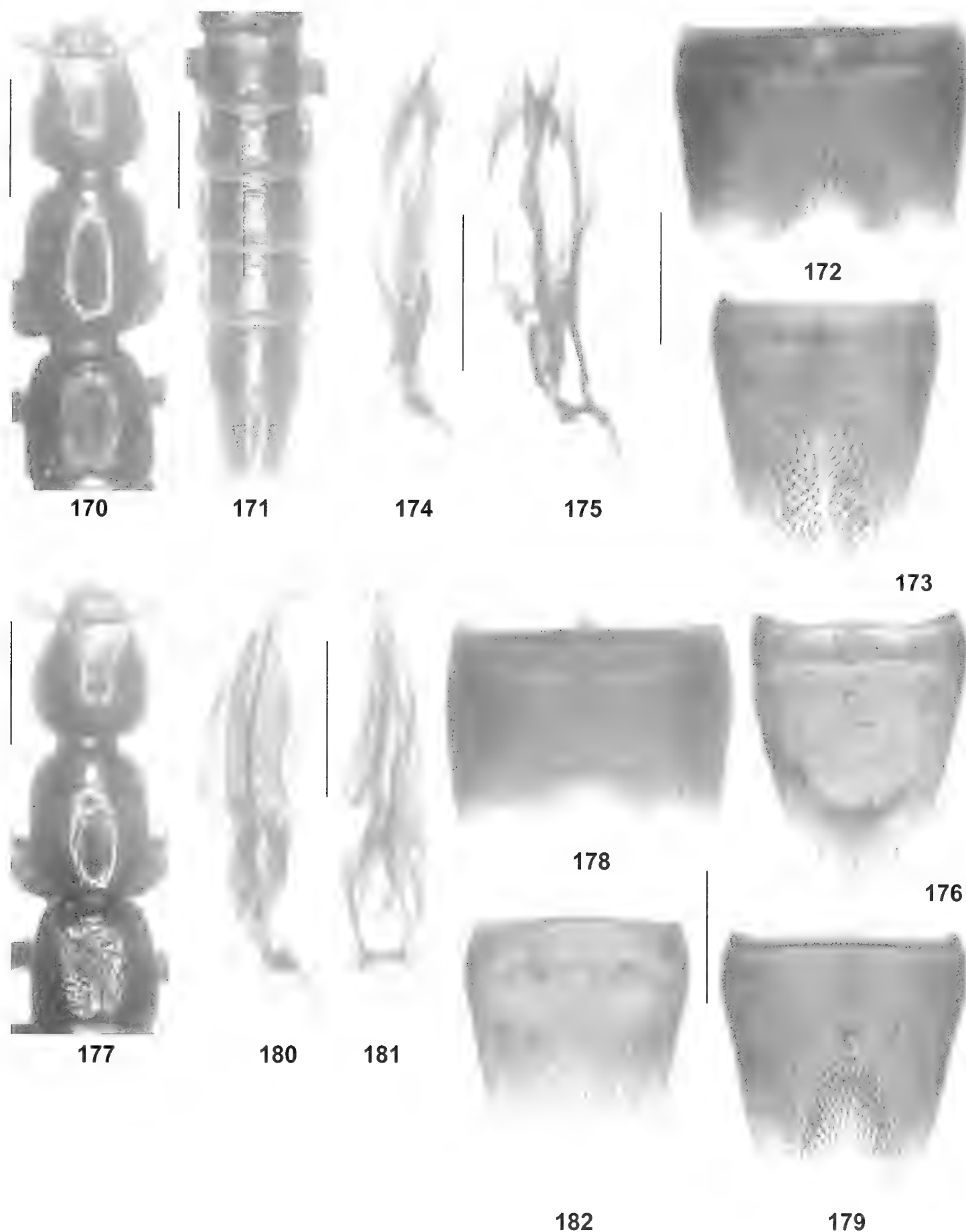
**Fig. 169.** Distributions of species of the *L. varisternale* group (filled symbols) and the *L. fissispinosum* group (open symbols): *L. tectiforme* (filled circles); *L. spinigerum* (open triangle); *L. longispinosum* (open circles); *L. rectispinosum* (open squares); *L. fissispinosum* (open diamonds).

### The *Lathrobium fissispinosum* species group

#### *Lathrobium fissispinosum* sp. n. (Figs 169–176)

**Type material.** Holotype ♂: “CHINA: W-Hubei (Daba Shan), pass E of Mt. Da Shennongjia, 12 km NW Muyuping, 31°30’N, 110°21’E, 19.VII.2001, leg. M. Schülke [C01-13C] / creek valley, 1950–2050 m, mixed deciduous forest, moss, dead wood, mushrooms (sifted) [C01-13C] / Holotypus ♂ *Lathrobium fissispinosum* sp. n., det. V. Assing 2012” (cSch). Paratypes: 4♂, 2♀: same data as holotype (cSch, cAss, ZFMK); 2♂, 2♀: same data, but “22.VII.2001 ... [13E]” (cSch, cAss); 2♂, 2♀: “China (Daba Shan) pass E Mt. Da Shennongjia, 12 km NW Muyuping 31°30’N, 110°21’E 1950 m (dry creek vall., mix. decid. forest) 16.–22.VII.2001 Wrase [13]” (cSch); 1♂, 8♀: “CHINA: W-Hubei daba [sic] Shan pass E of Mt. Shennongjia 12 km / NW Muyuping 31°30’N 110°21’E 1950 m A. Smetana [C117]” (cSme, cAss); 2♀: same data as before, but “16.VII.2001 ... [C104]” (cSme); 1♂: same data as before, but “19.7.01 ... [C111] (cAss); 2♂, 4♀: “CHINA: W-Hubei (Daba Shan), mountain range NE Muyuping, pass 12 km N Muyuping, 31°32’N, 110°26’E, 2380 m, leg. M. Schülke [C01-15] / 17.VII.2001, N pass, N-slope with young deciduous forest, bank of small creek,

moss (sifted) [C01-15]” (cSch, cAss); 1♂: same data as before, but “21.VII.2001 ... [15C]”; 1♂: “CHINA (W-Hubei) Daba Shan, mountain range NE Muyuping, pass 12 km N Muyuping, 31°32’N, 110°26’E, 2380 m, N pass (N-slope, young decid. for., shrubs, moss) 17.–21.VIII.2001 Wrase [15]” (cAss); 1♂: “CHINA: W-Hubei Daba Shan mtn. range NE Muyuping pass 12 km / N Muyu-ping 31°32’N 110°26’E 2380 m 17.7.01 A. Smetana [C107]” (cSme); 2♀: “CHINA (W-Hubei) Daba Shan, creek vall. 11 km NW Muyuping, 31°30’N, 110°22’E, 1960 m (creek vall., mix. decid. for., moss, leaves-sift.) 18.VII.2001 Wrase [17]” (cSch); 2♂, 1♀: “CHINA: W-Hubei Daba Shan crk. valley 11 km NW Muyuping 31°30’N / 110°22’E 1960 m, 18.VII.2001 A. Smetana [C109]” (cSme, cAss); 1♀: “CHINA: W-Hubei Daba Shan mtn. range NE Muyuping crk. valley / 4 km N Muyuping 1700 m 21.7.01 A. Smetana [C116]” (cSme); 1♂, 1♀: “China, W Hubei, Shennongjia Nat. Res., 2000–2200 m, litter, 7.VI.95 S. Kurbatov” (MHNG, cAss); 2♂, 2♀ [evidently mislabelled]: “CHINA: S-Shaanxi (Qinling Shan), pass on rd. Zhouzhi - Foping, 105 km SW Xi’an, N-slope, 1880 m, 33°44’N, 107°58’E, leg. M. Schülke [C01-03] / 4.VII.2001, shady rockwall base, moist (sifted) [C01-03]” (cSch, cAss).



**Figs 170–182.** *Lathrobium fissispinosum* (170–176) and *L. rectispinosum* (177–182). 170, 177. Forebody. 171. Abdomen. 172, 178. Male sternite VII. 173, 179. Male sternite VIII. 174–175, 180–181. Aedeagus in lateral and in (latero-)ventral view. 176, 182. Female sternite VIII. Scale bars: 170–171, 177: 1.0 mm; 172–176, 178–182: 0.5 mm.

**Etymology.** The specific epithet (Latin, adjective: with split spine) alludes to the apically bifid spine in the internal sac of the aedeagus.

**Description.** Size without sexual dimorphism; body length 7.3–9.0 mm; length of forebody 3.4–3.9 mm. Coloration: body dark-brown to blackish with paler abdominal apex (segments IX–X); legs dark-reddish to brown; antennae reddish.

Head (Fig. 170) approximately as broad as, or slightly broader than long; punctation moderately coarse and rather sparse, even sparser in median dorsal portion; interstices on average broader than punctures, with fine, but distinct microreticulation and subdued shine. Eyes moderately small, composed of > 50 ommatidia, approximately 1/4 the length of postocular region in dorsal view, and approximately 0.35–0.40 times as long as postocular region in lateral view. Antenna 1.8–2.0 mm long.

Pronotum (Fig. 170) approximately 1.25 times as long as broad, indistinctly broader than head; punctation similar to that of head, but somewhat sparser; midline rather narrowly impunctate; interstices without microsculpture and glossy.

Elytra (Fig. 170) short, approximately 0.55 times as long as pronotum; punctation relatively sparse and defined; interstices without microsculpture. Hind wings completely reduced.

Abdomen (Fig. 171) with fine punctation, punctures on tergites III–VI dense, those on tergites VII and VIII distinctly sparser; interstices with very shallow, almost obsolete microsculpture and rather glossy; posterior margin of tergite VII without palisade fringe.

♂: protarsomeres I–IV strongly dilated; tergite VIII with moderately convex posterior margin; sternites III–VI unmodified; sternite VII (Fig. 172) with distinct median impression posteriorly, this impression with numerous distinctly modified, stout black setae, posterior margin distinctly concave in the middle; sternite VIII (Fig. 173) weakly oblong, distinctly tapering posteriorly, with oblong and extensive median impression in posterior two thirds, this impression without setae along the middle, on either side of middle with numerous distinctly modified, stout black setae, posterior excision shallowly V-shaped; aedeagus (Figs 174–175) 1.5 mm long, strongly modified, asymmetric and somewhat twisted; internal sac with long and apically bifid sclerotized spine.

♀: protarsomeres I–IV distinctly dilated, but slightly less so than in male; posterior margin of tergite VIII strongly convex; sternite VIII (Fig. 176) 1.1–1.2 mm long, distinctly oblong, and convexly produced posteriorly; tergite IX anteriorly undivided; tergite X weakly convex in cross-section, much longer (ca. 2.7 ×) than tergite IX in the middle.

**Comparative notes.** *Lathrobium fissispinosum* is distinguished from all its congeners particularly by the derived male sexual characters. It is additionally separated from the syntopic *L. curvispinosum* and *L. bifidum* as follows: from *L. curvispinosum* by smaller size, paler coloration of the abdominal apex and the legs, denser punctation of the pronotum, distinctly denser punctation of tergites VII and VIII, the more strongly convex posterior margin of the female tergite VIII, and the more slender and differently shaped female sternite VIII; from *L. bifidum* by larger size, darker coloration, the absence of a dimorphism of the metatibiae, and the different shape of the female sternite VIII.

**Distribution and natural history.** The species was found in several localities in the Daba Shan, to the north and northwest of Muyuping (Fig. 169). Remarkably, according to their labels, three specimens were collected in the Qinling Shan to the southwest of Xi'an, some 330 km to the northwest of the localities in the Daba Shan. In view of the usually restricted distributions of micropterous *Lathrobium* species in China, such a vast extension of the range of this species would seem exceptional and requires confirmation. Mislabelled specimens are not unprecedented. The type specimens were sifted from the leaf litter and moss in mixed deciduous forests at altitudes of 1700–2380 m, partly together with *L. curvispinosum* and *L. bifidum*.

#### *Lathrobium rectispinosum* sp. n. (Figs 169, 177–182)

**Type material.** Holotype ♂: “CHINA: S-Shaanxi (Daba Shan), NW pass 25 km NW Zhenping, 32°01'N, 109°19'E, 2150 m, 11.VII.2001, leg. M. Schülke [C01-09] / creek valley, young coniferous forest, moss (sifted) [C01-09] / Holotypus ♂ *Lathrobium rectispinosum* sp. n., det. V. Assing 2012” (cSch). Paratypes: 4♀: same data as holotype (cSch, ZFMK); 3♂, 2♀: “CHINA: S-Shaanxi (Daba Shan), mountain range N pass 22 km NW Zhenping, N-slope, 32°01'N, 109°21'E, 2400 m, 13.VII.2001, leg. M. Schülke [C01-11] / mixed forest (Pinus Salix and other deciduous trees) (sifted) [C01-11] (cSch, cAss); 1♀: “CHINA Shaanxi Daba Shan NW pass 25 km NW Zhenping 32°01'N / 109°19'E 2150 m 11.VII.2001 A. Smetana [C99]” (cSme).

**Etymology.** The specific epithet (Latin, adjective: with straight spine) alludes to the long and straight spine in the internal sac of the aedeagus.

**Description.** Size without sexual dimorphism; body length 6.8–8.3 mm; length of forebody 3.2–3.6 mm. Coloration: body blackish-brown to blackish; legs dark-reddish; antennae reddish.

External characters (Fig. 177) as in *L. fissispinosum*, distinguished only by the sexual characters.

♂: protarsomeres I–IV strongly dilated; tergite VIII with weakly convex posterior margin; sternites III–VI unmodified; sternite VII (Fig. 178) with distinct median impression posteriorly, this impression with numerous very weakly modified setae, posterior margin distinctly concave in the middle; sternite VIII (Fig. 179) approximately as long as broad, distinctly tapering posteriorly, with moderately extensive median impression posteriorly, this impression with numerous distinctly modified, stout black setae, posterior excision relatively small and anteriorly concave; aedeagus (Figs 180–181) approximately 1.4 mm long, strongly modified, asymmetric and somewhat twisted, with two large, lamelliform lateral lobes and a long, slender, and somewhat curved (lateral view) median lobe; internal sac with long and straight sclerotized spine.

♀: protarsomeres I–IV dilated, but distinctly less so than in male; posterior margin of tergite VIII distinctly convex; sternite VIII (Fig. 182) approximately 1.1 mm long, moderately oblong, and with broadly convex posterior margin; tergite IX with short and undivided anterior median portion; tergite X weakly convex in cross-section, longer (ca. 2.0 ×) than tergite IX in the middle.

**Comparative notes.** *Lathrobium rectispinosum* is evidently most closely allied to *L. fissispinosum*, as can be inferred from the similar external and male sexual characters. It is distinguished from all its congeners particularly by the derived morphology of the aedeagus (presence of long straight spine in internal sac, ventral process subdivided into three lobes, the lateral ones lamellate), as well as by the shapes and chaetotaxy of the male sternites VII and VIII. It additionally differs from *L. fissispinosum* by the different shape of the female sternite VIII and by the relatively shorter female tergite X, i.e., the longer anterior median portion of the female tergite IX.

**Distribution and natural history.** The species is was found in two localities in the Daba Shan, to the northwest of Zhenping, Shaanxi (Fig. 169). The specimens were sifted from leaf litter and moss in a young coniferous forest and in a mixed forest at altitudes of 2150 and 2400 m, partly together with *L. aquilinum*.

***Lathrobium curvispinosum* sp. n.** (Figs 183–189, 198)

**Type material.** Holotype ♂: “CHINA: W-Hubei (Daba Shan), pass E of Mt. Da Shennongjia, 12 km NW Muyuping, 31°30'N, 110°21'E, 19.VII.2001, leg. M. Schülke [C01-13C] / creek valley, 1950–2050 m, mixed deciduous forest, moss, dead wood, mushrooms (sifted) [C01-13C] / Holotypus ♂ *Lathrobium curvispinosum* sp. n., det. V. Assing 2012” (cSch). Paratypes: 1 ♀: same data as holo-

type, but “22.VII.2001 ... [13E]” (cSch); 2 ♂: “China (Daba Shan) pass E Mt. Da Shennongjia, 12 km NW Muyuping 31°30'N, 110°21'E 1950 m (dry creek vall., mix. decid. forest) 16.–22.VII.2001 Wrase [13]” (cAss); 3 ♂, 6 ♀: “CHINA: W-Hubei daba [sic] Shan pass E of Mt. Shennongjia 12 km / NW Muyuping 31°30'N 110°21'E 1950 m A. Smetana [C117]” (cSme, cAss); 1 ♂: “CHINA: W-Hubei (Daba Shan), mountain range NE Muyuping, pass 12 km N Muyuping, 31°32'N, 110°26'E, 2380, leg. M. Schülke [C01-15] / 17.VII.2001, N pass, N-slope with young deciduous forest, bank of small creek, moss (sifted) [C01-15]” (cSch); 1 ♂: “CHINA: W-Hubei Daba Shan crk. valley 11 km NW Muyuping 31°30'N / 110°22'E 1960 m, 18.VII.2001 A. Smetana [C109]” (cAss); 1 ♂: “China, W Hubei, Shennongjia Nat. Res., 2000–2200 m, litter, 7.VI.95 S. Kurbatov” (MHNG).

**Etymology.** The specific epithet (Latin, adjective: with straight spine) alludes to the long and curved spine in the internal sac of the aedeagus.

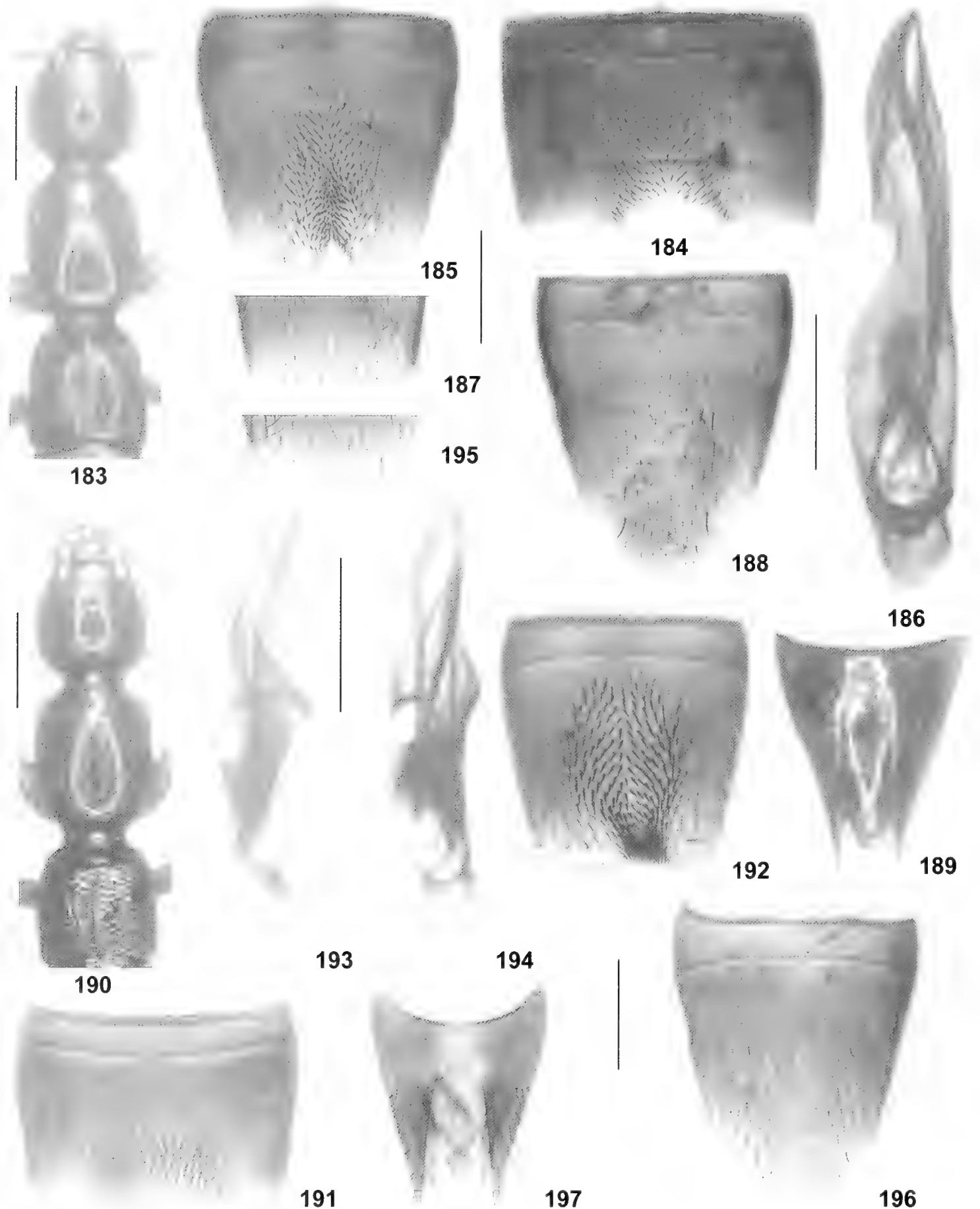
**Description.** Relatively large species, size without sexual dimorphism; body length 8.4–10.0 mm; length of forebody 4.2–4.7 mm. Coloration: body blackish; legs dark-brown to blackish-brown with paler tarsi; antennae reddish-brown.

Externally similar to the smaller *L. fissispinosum*, but distinguished as follows:

Pronotum (Fig. 183) broad, approximately 1.2 times as long as broad; punctation of tergite VII nearly as dense as that of tergites III–VI; tergite VIII without sexual dimorphism, posterior ♂: protarsomeres I–IV strongly dilated; tergite VIII with weakly convex posterior margin; sternites III–VI unmodified; sternite VII (Fig. 185) with shallow median impression, this impression with numerous very weakly modified setae, posterior margin distinctly concave in the middle; sternite VIII (Fig. 185) approximately as long as broad, moderately tapering posteriorly, with extensive median depression, this depression with numerous distinctly modified, stout black setae, posterior excision moderately deep and V-shaped; aedeagus (Fig. 186) 1.8–1.9 mm long and asymmetric; ventral process modified, somewhat twisted, apically acute, and in the middle distinctly notched on the left side in ventral view; internal sac with long and curved sclerotized spine.

♀: protarsomeres I–IV dilated, but distinctly less so than in male; sternite VIII (Fig. 188) approximately 1.4 mm long, moderately oblong, and posteriorly convexly produced; tergite IX anteriorly very narrowly undivided, but with fine suture (Fig. 189); tergite X weakly convex in cross-section posteriorly, anteriorly flat, almost reaching anterior margin of tergite IX in the middle.

**Comparative notes.** *Lathrobium curvispinosum* is evidently closely allied to the partly syntopic *L. fis-*



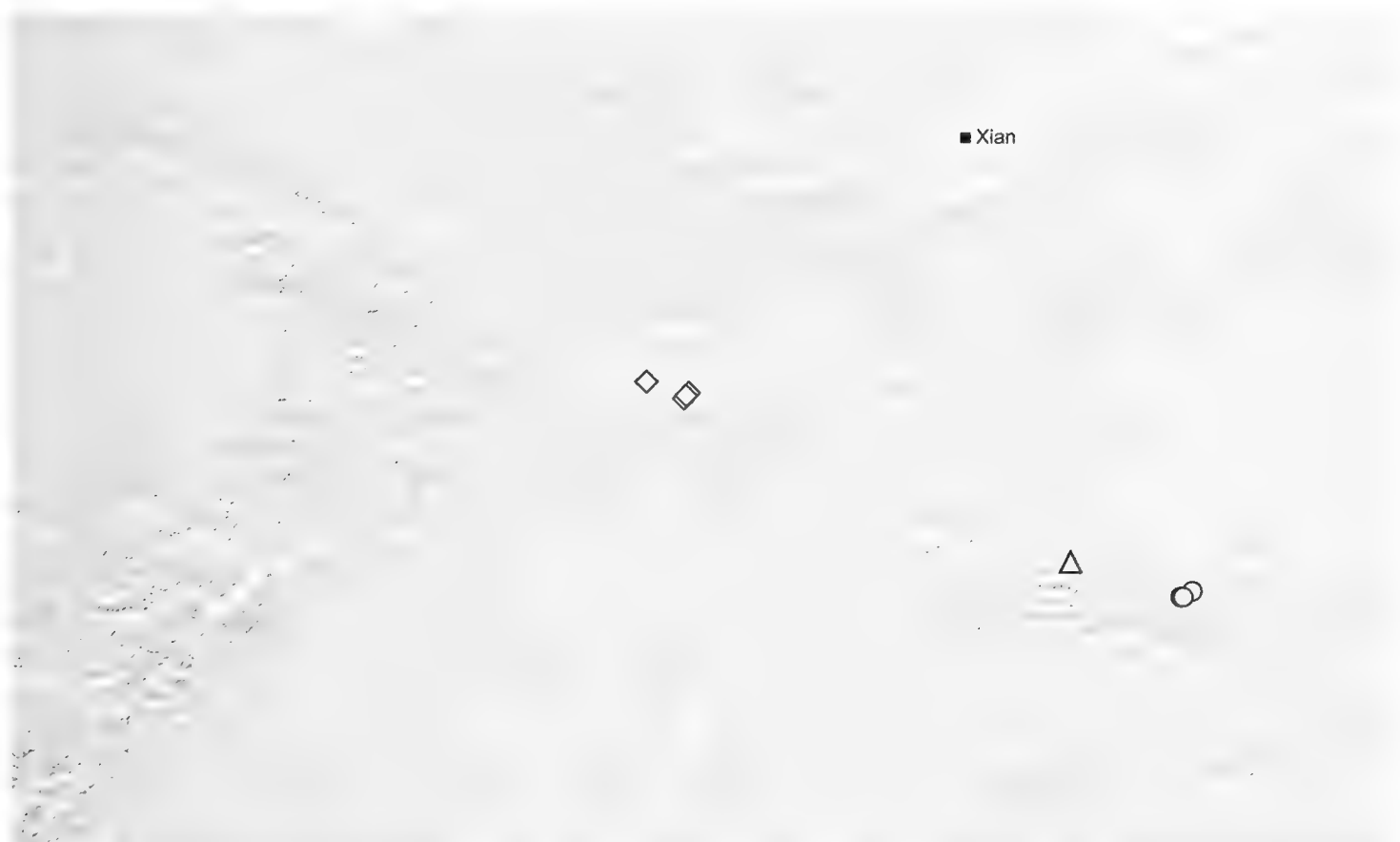
**Figs 183–197.** *Lathrobium curvispinosum* (183–189) and *L. longispinosum* (190–197). **183, 190.** Forebody. **184, 191.** Male sternite VII. **185, 192.** Male sternite VIII. **186, 193–194.** Aedeagus in lateral and in latero-ventral view. **187, 195.** Posterior portion of female tergite VIII. **188, 196.** Female sternite VIII. **189, 197.** Female tergites IX–X. Scale bars: 183, 190: 1.0 mm; 184–189, 191–197: 0.5 mm.

*sispinosum*, *L. rectispinosum*, and *L. longispinosum*, as can be inferred particularly from the synapomorphically derived morphology of the aedeagus, especially the presence of a long sclerotized spine in the internal sac and the asymmetric ventral process, but also from the similar external morphology, the shape and chaetotaxy of the male sternite VII (posterior margin distinctly concave in the middle), the similar shape and chaetotaxy of the male sternite VIII, and the anteriorly short median portion of the female tergite IX. *Lathrobium curvispinosum* differs from the syntopic *L. fissispinosum* by larger body size, darker coloration, a broader pronotum, the denser punctation of the abdominal tergite VII, the deeper posterior concavity of the male sternite VII, the shape and chaetotaxy of the male sternite VIII (not oblong, deeper and V-shaped posterior excision, denser cluster of modified setae), the different shape of the ventral process of the aedeagus, the apically unsplit internal spine of the aedeagus, and by the less oblong female sternite VIII. From all geographically close congeners, *L. curvispinosum* is distinguished by larger size and darker coloration alone.

**Distribution and natural history.** The species was found in four geographically close localities in the Daba Shan, western Hubei, to the north and northwest of Muyuping (Fig. 198). The specimens were sifted from leaf litter and moss in mixed deciduous forests at altitudes of 1950–2380 m, together with *L. fissispinosum* and *L. bifidum*.

***Lathrobium longispinosum* sp. n.** (Figs 169, 190–197)

**Type material.** Holotype ♂: “CHINA [29]- S-Shaanxi, Micang Shan, 30 km S Hanzhong, 32°45’56”N, 106°53’57”E, 1070 m, 15.VIII.2012, V. Assing / Holotypus ♂ *Lathrobium longispinosum* sp. n., det. V. Assing 2012” (cAss). Paratypes: 1♂, 1♀: same data as holotype (cAss); 1♀: “CHINA: S-Shaanxi [CH12-29], Micang Shan, 30 km S Hanzhong, 32°45’56”N, 106°53’57”E, 1070 m, stream valley, litter and soil sifted, 15.VIII.2012, leg. M. Schülke” (cSch); 2♂, 11♀ [3♀ teneral]: “CHINA [27] - S-Shaanxi, Micang Shan, 42 km S Hanzhong, 32°40’52”N, 106°49’16”E, 1090 m, 14.VIII.2012, V. Assing” (cAss); 1♂, 2♀ [1♀ teneral]: “CHINA: S-Shaanxi [CH12-27], Micang Shan, 42 km S Hanzhong, 32°40’52”N, 106°49’16”E, 1090 m, NW-slope, mixed forest margin with rocks, litter, grass, and moss sifted, 14.VIII.2012, leg. M. Schülke” (cSch, ZFMK); 7♂, 4♀ [4♂, 1♀ teneral]: “CHINA [32] - S-Shaanxi [recte: N-Sichuan], Micang Shan, 42 km S Hanzhong, 32°40’43”N, 106°48’33”E, 1090 m, 17.VIII.2012, V. Assing” (cAss), 1♂, 2♀ [1♀ teneral]: “CHINA: S-Shaanxi [recte: N-Sichuan] [CH12-32], Micang Shan, 42 km S Hanzhong, 32°40’43”N, 106°48’33”E, 1090 m, stream valley, shady S-slope, sec. mixed forest, litter, grass, and herbs near path sifted, 17.VIII.2012, M. Schülke” (cSch).



**Fig. 198.** Distributions of species of the *L. fissispinosum* group: *L. crassispinosum* (open diamonds); *L. trifidum* (open triangle); *L. curvispinosum* (open circles).

**Etymology.** The specific epithet (Latin, adjective: with straight spine) alludes to the long spine in the internal sac of the aedeagus.

**Description.** Relatively large species, size subject to weakly pronounced sexual dimorphism, males slightly larger on average; body length 8.0–9.5 mm (♂), 7.5–9.0 mm (♀); length of forebody 4.2–4.5 mm (♂), 3.7–4.3 mm (♀). Coloration: body blackish, with the apex of the abdomen (posterior margin of segment VII; segments VIII–X) reddish-brown; legs reddish, with the femora usually darker; antennae reddish.

Head (Fig. 190) weakly transverse, approximately 1.05 times as broad as long; posterior angles moderately marked, rounded but noticeable; punctation relatively coarse and dense, sparser in median dorsal portion; interstices glossy, with shallow, often only with barely noticeable traces of microreticulation, on average as broad as, or narrower than diameter of punctures, broader than diameter of punctures in median dorsal portion. Eyes relatively small, approximately 1/4 the length of postocular region in dorsal view and 0.3 times as long as distance from posterior margin of eye to posterior constriction in lateral view. Antenna 2.2–2.4 mm long.

Pronotum (Fig. 190) broad, approximately 1.2 times as long as broad, and slightly broader than head; punctation similar to that of head; interstices without microreticulation.

Elytra (Fig. 190) short, approximately 0.5 times as long as pronotum; punctation dense, rather coarse, and usually defined. Hind wings completely reduced.

Abdomen with punctation of tergites III–VI dense and not particularly fine, that of tergites VII and VIII fine and distinctly sparser; posterior margin of tergite VII without palisade fringe; tergite VIII with moderately pronounced sexual dimorphism.

♂: protarsomeres I–IV moderately strongly dilated; tergite VIII with distinctly convex posterior margin; sternites III–VI unmodified; sternite VII (Fig. 191) moderately transverse and with shallow and extensive median impression posteriorly, this impression with numerous distinctly modified, stout and black setae, posterior margin rather weakly concave in the middle; sternite VIII (Fig. 192) weakly oblong, with extensive, distinct, somewhat asymmetrically oblique, and broad median impression, this impression with numerous strongly modified, stout and black setae, posteriorly with cluster of conspicuously dense black setae, posterior excision broad, weakly concave, and in asymmetric position; aedeagus (Figs 193–194) approximately 1.5 mm long and asymmetric; ventral process modified, subdivided into two large lamellate lobes of different shapes; internal sac with long and weakly curved sclerotized spine.

♀: protarsomeres I–IV dilated, only slightly less so than in male; posterior margin of tergite VIII obtusely point-

ed in the middle (Fig. 195); sternite VIII (Fig. 196) approximately 1.2–1.3 mm long, moderately oblong, posterior margin distinctly convex; tergite IX anteriorly undivided, without suture; tergite X weakly convex, almost flat in cross-section, distinctly longer than tergite IX in the middle (Fig. 197).

**Comparative notes.** As can be inferred from the similarly derived male and female sexual characters, particularly the general morphology of the aedeagus and the presence of a long sclerotized spine in the internal sac, *L. longispinosum* undoubtedly belongs to the *L. fissispinosum* group. It is distinguished from all the species of this group by the much shallower microreticulation of the head, by the shapes and chaetotaxy of the male sternites VII and VIII, by the morphology of the aedeagus, and also, though less clearly, by the female terminalia. The aedeagus is most similar to that of *L. rectispinosum*, from which *L. longispinosum* differs by larger body size, darker coloration of the body, relatively smaller eyes, and the sexual characters.

**Distribution and natural history.** The species was found in three geographically close localities in the Micang Shan, southern Shaanxi, to the south of Hanzhong (Fig. 169). The specimens were sifted from leaf litter, grass roots, and moss in mixed forests and from the soil along a forest path at an altitude of 1070–1090 m, partly together with *L. sinense* and *L. crassispinosum*. Some of the specimens are teneral.

### *Lathrobium spinigerum* sp. n. (Figs 169, 199–205)

**Type material.** Holotype ♂: “CHINA [31] - S-Shaanxi, Micang Shan, 40 km SW Hanzhong, 32°52'25"N, 106°37'11"E, 1530 m, 16.VIII.2012, V. Assing / Holotypus ♂ *Lathrobium spinigerum* sp. n., det. V. Assing 2012” (cAss). Paratypes: 2♂, 4♀ [1♂, 3♀ teneral]: same data as holotype (cAss).

**Etymology.** The specific epithet (Latin, adjective: with spines) alludes to the presence of a long sclerotized spine in the internal sac of the aedeagus.

**Description.** Species of moderate size without apparent sexual size dimorphism; body length 5.8–6.7 mm; length of forebody 2.8–3.2 mm. Coloration: body dark-brown; legs reddish to pale-brown; antennae reddish.

Head (Fig. 199) approximately as broad as long; punctation relatively fine and rather sparse, even sparser in median dorsal portion; interstices on dorsal surface on average distinctly broader than punctures, with distinct microreticulation and almost matt. Eyes moderately small, composed of > 50 ommatidia, little less than 1/3 the length

of postocular region in dorsal view, and approximately 0.4 times as long as postocular region in lateral view. Antenna approximately 1.6 mm long.

Pronotum (Fig. 199) approximately 1.25 times as long as broad and 1.05 times as broad as head, distinctly tapering posteriorly; punctuation relatively fine and sparse; midline rather broadly impunctate; interstices without microsculpture and glossy, distinctly broader than diameter of punctures.

Elytra (Fig. 199) short, approximately 0.55 times as long as pronotum; punctuation of variable density, shallow and ill-defined to defined, dense to moderately dense; interstices without microsculpture, narrower to broader than diameter of punctures. Hind wings completely reduced.

Abdomen with fine punctuation, punctures only slightly sparser on tergites VII and VIII than on anterior tergites; interstices with fine, shallow microsculpture; posterior margin of tergite VII without palisade fringe; posterior margin of tergite VIII sexually dimorphic.

♂: protarsomeres I–IV strongly dilated; tergite VIII with moderately convex posterior margin; sternites III–VI unmodified; sternite VII (Fig. 200) moderately transverse, with small and shallow median impression posteriorly, posterior margin weakly concave in the middle, pubescence unmodified, except for few weakly modified dark marginal setae near posterior concavity; sternite VIII (Fig. 201) weakly transverse, with extensive, shallow median impression, this impression with numerous strongly modified stout black setae, posterior margin truncate; aedeagus (Figs 202–203) approximately 1.0 mm long and distinctly asymmetric; ventral process divided into two lobes of different shapes, right lobe (ventral view) much longer than left lobe; dorsal plate strongly sclerotized, broadly lamellate, tapering apicad, and apically acute; internal sac with distinctly sclerotized long and in the middle obtusely angular spine.

♀: protarsomeres I–IV dilated, but distinctly less so than in male; tergite VIII distinctly and almost triangularly produced posteriorly; sternite VIII (Fig. 204) approximately 0.9 mm long, oblong, and gradually tapering posteriorly, and with strongly convex posterior margin; tergite IX anteriorly divided; tergite X separating tergite IX anteriorly and reaching anterior margin of tergite IX (Fig. 205).

**Comparative notes.** Based on the morphology of the aedeagus (presence of a long sclerotized spine in the internal sac, ventral process asymmetric, subdivided into two lobes of unequal size and shapes, basal portion of aedeagus small), *L. spinigerum* belongs to the *L. fissispinosum* group. The morphology of the ventral process and the dorsal plate of the aedeagus, the similar shape and chaetotaxy of the male sternite VII, the similarly derived shape and chaetotaxy of the male sternite VIII, the anteriorly completely divided female tergite IX, as well as the similar external characters suggest that it is the adelphotax-

on of the geographically close *L. crassispinosum*, from which *L. spinigerum* differs by the truncate posterior margin (*L. crassispinosum*: posterior margin convex) and the arrangement of the modified setae of the male sternite VI–II, the shapes of the ventral process and the dorsal plate of the aedeagus, the obtusely angular internal spine of the aedeagus (*L. crassispinosum*: spine almost straight), and the posteriorly less strongly convex female sternite VIII.

**Distribution and natural history.** The type locality is situated in the Micang Shan, to the southwest of Hanzhong, southern Shaanxi (Fig. 169). The partly teneral specimens were sifted from leaf litter and moss in a mixed secondary forest at an altitude of 1530 m, together with *L. ser-ri lobatum*.

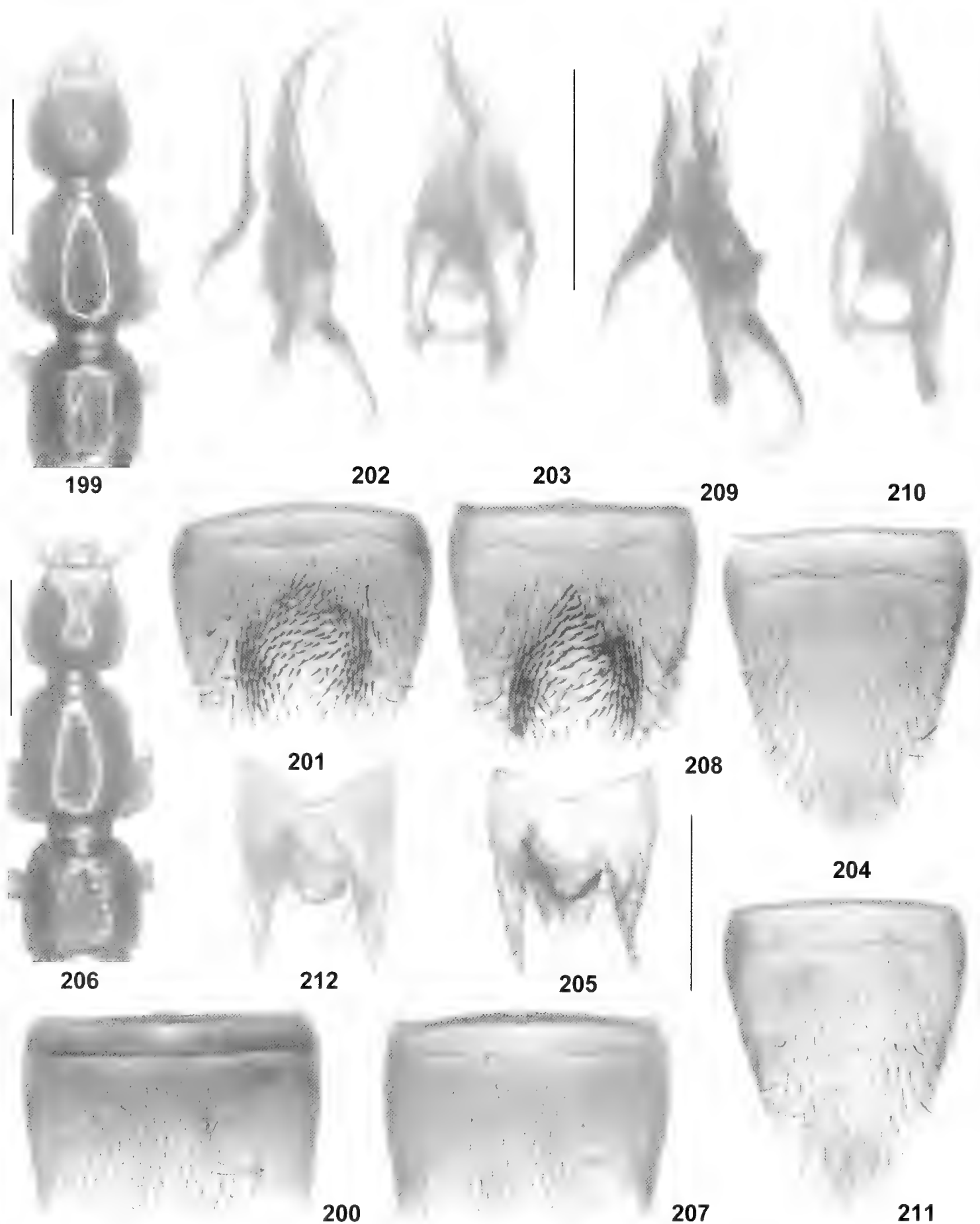
### *Lathrobium crassispinosum* sp. n. (Figs 198, 206–212)

**Type material.** Holotype ♂: “CHINA [28]- S-Shaanxi Micang Shan, 34 km S Hanzhong, 32°44'22"N, 106°51'55"E, 1460 m, 14.VIII.2012, V. Assing / Holotypus *Lathrobium crassispinosum* sp. n., det. V. Assing 2012” (cAss). Paratypes: 4♂, 7♀ [3♂, 4♀ teneral]: same data as holotype (cAss); 2♂, 1♀ [1♂, 1♀ teneral]: same data, but leg. Schülke (cSch, ZFMK); 2♂, 2♀: “CHINA [29]- S-Shaanxi Micang Shan, 30 km S Hanzhong, 32°45'56"N, 106°53'57"E, 1070 m, 15.VIII.2012, V. Assing” (cAss); 1♂, 1♀ [both teneral]: same data, but leg. M. Schülke (cSch); 3♂, 3♀ [1♂, 1♀ teneral]: “CHINA [30] - S-Shaanxi Micang Shan, 33 km S Hanzhong, 32°44'44"N, 106°52'46"E, 1360 m, 15.VIII.2012, V. Assing” (cAss); 1♂ [teneral]: same data, but leg. Schülke (cSch); 2♂, 2♀: “CHINA [32] - S-Shaanxi [recte: N-Sichuan], Micang Shan, 42 km S Hanzhong, 32°40'43"N, 106°48'33"E, 1090 m, 17.VIII.2012, V. Assing” (cAss); 2♂: same data, but leg. Schülke (cSch); 1♂: “CHINA: Shaanxi Prov., Nanzheng County, Liping National Forest Park, 32°50'N, 106°36'E, 12.vii.2012, alt. 1,400–1,600 m, Chen, Li, Ma, Zhao & Pan leg.” (SNUC).

**Etymology.** The specific epithet (Latin, adjective: with stout spine) alludes to the presence of a long and stout sclerotized spine in the internal sac of the aedeagus.

**Description.** Species of moderate size without apparent sexual size dimorphism; body length 6.0–7.2 mm; length of forebody 3.0–3.3 mm. External characters (Fig. 206) as in *L. spinigerum*.

♂: protarsomeres I–IV strongly dilated; tergite VIII with convex posterior margin; sternites III–VI unmodified; sternite VII (Fig. 207) moderately transverse, with shallow median impression posteriorly, posterior margin weakly concave in the middle, pubescence unmodified, except for few weakly modified dark marginal setae near posterior



**Figs 199–212.** *Lathrobium spinigerum* (199–205) and *L. crassispinosum* (206–212). 199, 206. Forebody. 200, 207. Male sternite VII. 201, 208. Male sternite VIII. 202–203, 209–210. Aedeagus in lateral and in ventral view. 204, 211. Female sternite VIII. 205, 212. Female tergites IX–X. Scale bars: 199, 206: 1.0 mm; 200–205, 207–212: 0.5 mm.

concavity; sternite VIII (Fig. 208) weakly transverse, with extensive median impression, this impression with numerous strongly modified stout black setae, posterior margin convex; aedeagus (Figs 209–210) approximately 1.0 mm long and distinctly asymmetric; ventral process divided into two lobes of different shapes, right lobe (ventral view) much larger and longer than left lobe; dorsal plate strongly sclerotized, broadly lamellate, and apically truncate in dorsal view; internal sac with distinctly sclerotized, long and stout spine.

♀: protarsomeres I–IV dilated, but distinctly less so than in male; tergite VIII distinctly and almost triangularly produced posteriorly; sternite VIII (Fig. 211) approximately 0.9 mm long, oblong, and gradually tapering posteriad, and with almost acutely pointed posterior margin; tergite IX anteriorly divided; tergite X obtusely angled apically, separating tergite IX anteriorly, and reaching anterior margin of tergite IX (Fig. 212).

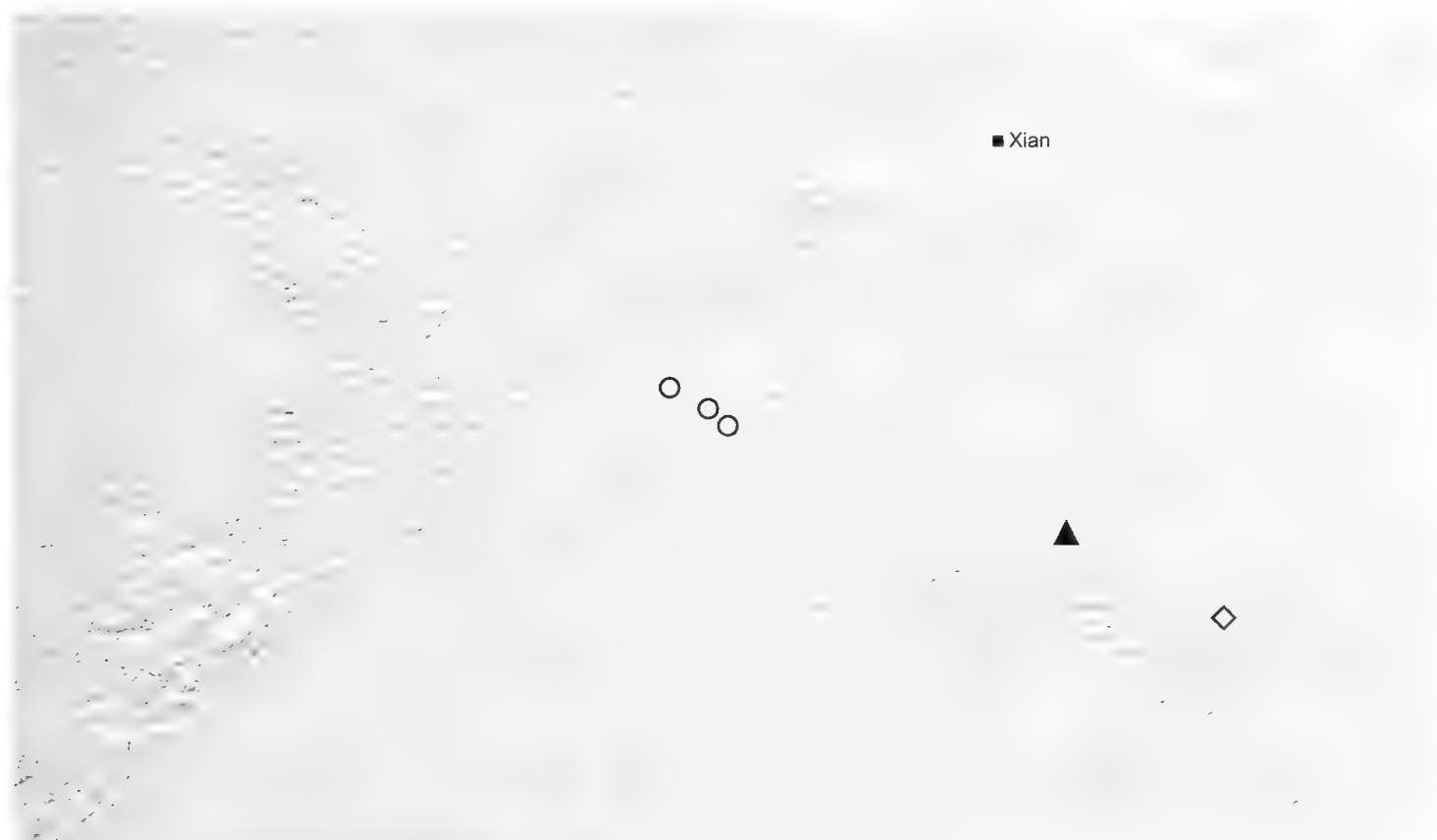
**Comparative notes.** Based on the morphology of the aedeagus (presence of a long sclerotized spine in the internal sac, ventral process asymmetric, subdivided into two lobes of unequal size and shapes, basal portion of aedeagus small), *L. crassispinosum* belongs to the *L. fissispinosum* group. The morphology of the ventral process and the dorsal plate of the aedeagus, the similar shape and chaetotaxy of the male sternite VII, the similarly derived shape and chaetotaxy of the male sternite VIII, the anteriorly completely divided female tergite IX, and the sim-

ilar external characters suggest that it is the adelphotaxon of *L. spinigerum*.

**Distribution and natural history.** The species was found in five geographically close localities in the Micang Shan, to the south of Hanzhong, southern Shaanxi and northern Sichuan (Fig. 198). The specimens were sifted from leaf litter, moss, grass roots, and soil in mixed and deciduous forests, and in stream valleys beneath shrubs at elevations from 1070 up to approximately 1500 m, partly together with *L. longispinosum* or *L. serrilobatum*. Several paratypes are teneral.

***Lathrobium serrilobatum* sp. n.** (Figs 213–223)

**Type material.** Holotype ♂: “CHINA [30] - S-Shaanxi, Micang Shan, 33 km S Hanzhong, 32°44'44"N, 106°52'46"E, 1360 m, 15.VIII.2012, V. Assing / Holotypus ♂ *Lathrobium serrilobatum* sp. n., det. V. Assing 2012” (cAss). Paratypes: 7♂, 7♀ [1♂, 3♀ teneral]: same data as holotype (cAss); 5♂, 3♀: same data, but leg. Schülke (cSch, ZFMK); 3♀: “CHINA [31] - S-Shaanxi, Micang Shan, 40 km SW Hanzhong, 32°52'25"N, 106°37'11"E, 1530 m, 16.VIII.2012, V. Assing” (cAss); 1♂ [teneral]: “CHINA (S.Shaanxi) Micang Shan, 40 km SW Hanzhong, 1530 m, 32°52'25"N, 106°37'11"E (N.slope, mixed secondary forest, litter, moss sifted) 16.VIII.2012 D.W. Wrase [31]” (cAss); 3♂, 5♀: “CHI-



**Fig. 213.** Distributions of species of the *L. fissispinosum* group (open symbols) and of the *L. aquilinum* group (filled symbol): *L. serrilobatum* (open circles); *L. bifidum* (open diamonds); *L. aquilinum* (filled triangle).

NA: Sichuan Prov., Nanjiang County, Mt. Micangshan, 32°39'N, 107°01'E, 27. iv.2008, alt. 1,800 m, Huang & Xu leg." (SNUC).

**Etymology.** The specific epithet is an adjective composed of the Latin noun *serra* (saw) and the Latin adjective *lobatum* (lobed) and refers to the serrate dorsal lobe of the bifid ventral process of the aedeagus.

**Description.** Size without sexual dimorphism; body length 7.2–8.7 mm; length of forebody 3.6–4.1 mm. Coloration: body castaneous to dark-brown, elytra sometimes slightly paler reddish; legs, except the often somewhat darker femora, and antennae reddish.

Head (Fig. 214) approximately as long as broad; punctation moderately coarse and rather sparse, even sparser in median dorsal portion; interstices on dorsal surface on average broader than punctures, with fine and shallow microreticulation. Eyes moderately small, composed of > 50 ommatidia, 1/4–1/3 the length of postocular region in dorsal view, and 0.30–0.35 times as long as postocular region in lateral view. Antenna approximately 2.0–2.1 mm long.

Pronotum (Fig. 214) moderately broad, approximately 1.25 times as long as broad and 1.05 times as broad as head; punctation similar to that of head; midline rather broadly impunctate; interstices without microsculpture and glossy.

Elytra (Fig. 214) short, 0.50–0.55 times as long as pronotum; punctation mostly shallow and ill-defined to defined; interstices without microsculpture. Hind wings completely reduced.

Abdomen with fine punctation, punctures on tergites III–V dense, on tergite VI somewhat less dense, and on tergites VII and VIII sparse and very fine; interstices with fine, shallow, transverse microsculpture and some shine; posterior margin of tergite VII without palisade fringe; tergite VIII with weakly convex posterior margin in both sexes (Fig. 215).

♂: protarsomeres I–IV moderately dilated; sternites III–VI unmodified; sternite VII (Fig. 216) moderately transverse, with weakly concave posterior margin, otherwise unmodified; sternite VIII (Fig. 217) approximately as long as broad, with shallow and extensive median impression, this impression with numerous moderately modified black setae, posterior excision asymmetric, rather broad, and not very deep; aedeagus (Figs 218–219) approximately 1.6 mm long, of distinctive shape, asymmetric, long and slender; ventral process subdivided into two lobes, the dorsal lobe conspicuously long, its ventral margins finely serrate (Figs 220–221), the ventral lobe much shorter and shaped like a scraper; basal portion of aedeagus small; dorsal plate reduced; internal sac without sclerotized spines and without distinct dark membranous structures.

♀: protarsomeres I–IV as dilated as in male; sternite VIII (Fig. 222) approximately 1.1 mm long, oblong, and with convex posterior margin; tergite IX anteriorly undivided; tergite X distinctly longer than tergite IX in the middle (Fig. 223).

**Comparative notes.** Based on the apically bilobed ventral process and the small basal portion of the aedeagus, as well as the anteriorly short and undivided median portion of the female tergite IX, *L. serrilobatum* is related to *L. fissispinosum* and allied species, though it lacks a long spine in the internal sac of the aedeagus. In external appearance, *L. serrilobatum* is similar to *L. rectispinosum*, but distinguished from this species by the shape of the head (weakly transverse in *L. rectispinosum*).

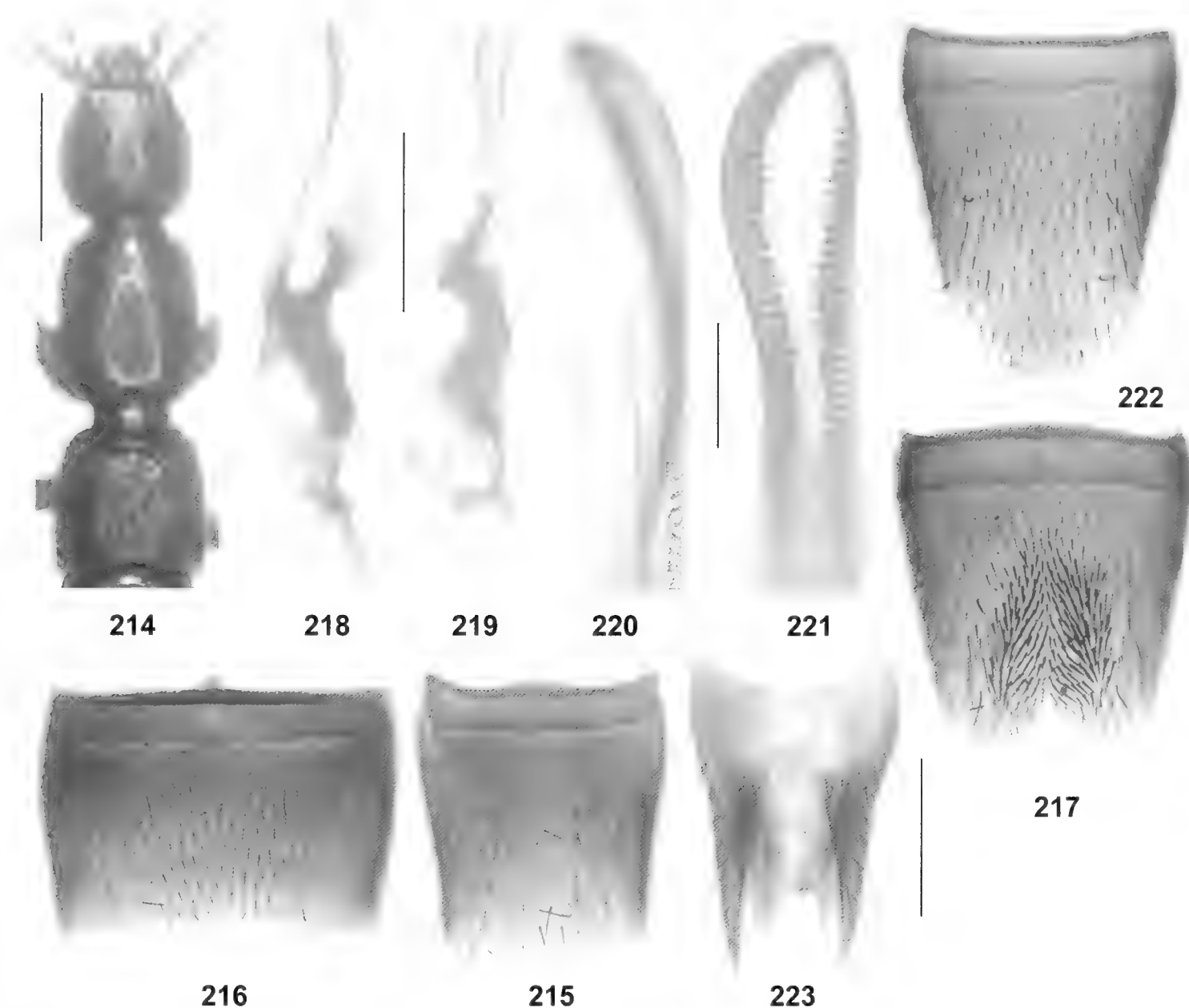
**Distribution and natural history.** The species was collected in three localities in the Micang Shan, two in Shaanxi to the southwest of Hanzhong and one in Sichuan in Nanjiang County (Fig. 213). The specimens from Shaanxi were sifted from leaf litter, moss and soil in mixed forests at altitudes of 1360 and 1530 m, together with *L. crassispinosum* and *L. spinigerum*. Those from Sichuan were collected at an altitude of 1800 m. Some of the paratypes from Shaanxi are teneral.

#### *Lathrobium trifidum* sp. n. (Figs 198, 224–233)

**Type material.** Holotype ♂: "CHINA: Border Shaanxi - Sichuan [now Chongqing] (Daba Shan), pass 20 km SSE Zhenping, 1700–1800 m, 31°44'N, 109°35'E, 12.VII.2001, leg. M. Schülke [C01-07C] / mixed forest, small creek valley, moss, bark (sifted) [C01-07C] / Holotypus ♂ *Lathrobium trifidum* sp. n., det. V. Assing 2012" (cSch). Paratypes: 1♂, 1♀: same data as holotype (cAss); 2♂, 2♀ [1♂, 1♀ teneral]: "CHINA (border Shaanxi-Sichuan [now Chongqing]) Daba Shan, pass 20 km SSE Zhenping 1700–1800 m 31°44'N, 109°35'E (small creek vall., young mixed forest, leaf litt., moss) 9.&12.VII.2001 Wrase [07]" (cSch, cAss, ZFMK); 2♂: "CHINA: border Shaanxi-Sichuan [now Chongqing] Daba Shan pass 20 km SSE Zhenping / 1700–1800 m 31°44'N 109°35'E 12.VII.2001 A. Smetana [C101]" (cAss); 1♀ [teneral]: same data, but "9.VII.2001 ... [C96b]" (cSme).

**Etymology.** The specific epithet (Latin, adjective: split into three parts) alludes to the shape of the ventral process of the aedeagus.

**Description.** Size rather variable, but without sexual dimorphism; body length 6.0–7.5 mm; length of forebody 2.9–3.4 mm. Coloration: body blackish-brown, elytra sometimes paler posteriorly, posterior margins of abdominal tergites dark-reddish; legs and antennae reddish.



**Figs 214–223.** *Lathrobium serrilobatum*. **214.** Forebody. **215.** Male tergite VIII. **216.** Male sternite VII. **217.** Male sternite VIII. **218–219.** Aedeagus in lateral and in ventral view. **220–221.** Apical portion of ventral process of aedeagus in lateral and in ventral view. **222.** Female sternite VIII. **223.** Female tergites IX–X. Scale bars: 214: 1.0 mm; 215–219, 222–223: 0.5 mm; 220–221: 0.1 mm.

Head (Fig. 224) weakly transverse, approximately 1.05 times as broad as long; punctuation moderately coarse and rather sparse, even sparser in median dorsal portion; interstices on dorsal surface on average broader than punctures, with fine and shallow microreticulation. Eyes moderately small, composed of > 50 ommatidia, 1/4–1/3 the length of postocular region in dorsal view, and approximately 0.35 times as long as postocular region in lateral view. Antenna approximately 1.6–1.8 mm long.

Pronotum (Fig. 224) rather broad, approximately 1.2 times as long as broad and 1.05 times as broad as head; punctuation similar to that of head; midline rather broadly impunctate; interstices without microsculpture and glossy.

Elytra (Fig. 224) short, 0.50–0.55 times as long as pronotum; punctuation of variable density, shallow and ill-defined to defined; interstices without microsculpture. Hind wings completely reduced. Metatibia with sexual dimorphism.

Abdomen with fine punctuation, punctures on tergites VII and VIII only slightly sparser than on anterior tergites; interstices with fine, shallow microsculpture and some shine; posterior margin of tergite VII without palisade fringe; posterior margin of tergite VIII sexually dimorphic.

♂: protarsomeres I–IV strongly dilated; internal face of metatibia angularly dilated approximately in the middle (Fig. 225); tergite VIII with weakly convex posterior margin (Fig. 226); sternite VII (Fig. 227) strongly transverse, weakly depressed and with very sparse unmodified setae

in posterior median portion; sternite VIII (Fig. 228) strongly modified and of distinctive shape and chaetotaxy, with shallow and extensive median impression posteriorly, middle of this impression without pubescence and semi-transparent, laterally with conspicuous clusters of numerous short and very stout black setae, posterior margin asymmetrically bisinuate, in the middle convexly projecting posteriad; aedeagus (Figs 229–230) approximately 1.1 mm long and of distinctive shape, ventral process strongly asymmetric, apically subdivided into three lamellate processes, two of them directed ventrad and one dorsad; dorsal plate broadly lamellate and distinctly sclerotized, without separate basal portion; internal sac with dark membranous structures, but without sclerotized spines.

♀: protarsomeres I–IV dilated, but distinctly less so than in male; tergite VIII (Fig. 231) distinctly and almost triangularly produced posteriorly; sternite VIII (Fig. 232) approximately 1.0 mm long, oblong, gradually tapering posteriad, and with convex posterior margin; tergite IX anteriorly divided; tergite X narrowly separating tergite IX anteriorly and nearly reaching anterior margin of tergite IX (Fig. 233).

**Comparative notes.** *Lathrobium trifidum* shares the asymmetric, apically divided ventral process of the aedeagus with the preceding species of the *L. fissispinosum* group, but differs from them by the absence of a long internal spine, the basally large aedeagal capsule, and by the completely divided female tergite IX. Regarding the latter character, it is similar to *L. aquilinum*, but both species are separated by so many other characters (shape of pronotum, sexual dimorphism of tergite VIII and metatibia, shapes and chaetotaxy of the male sternites VI and VII) that a particularly close relationship seems unlikely. The sexual dimorphism of the metatibia is a unique character among the *Lathrobium* species of the Qinling Shan and the Daba Shan.

**Distribution and natural history.** The type locality is situated in the Daba Shan, to the south-southeast of Zhenping, at the border between Shaanxi and Chongqing (Fig. 198). The specimens were sifted from leaf litter and moss in a young mixed forest at an altitude of 1700–1800 m. Three of the specimens are teneral.

***Lathrobium bifidum* sp. n.** (Figs 213, 234–242)

**Type material.** Holotype ♂: “CHINA: W-Hubei (Daba Shan), pass E of Mt. Da Shennongjia, 12 km NW Muyuping, 31°30'N, 110°21'E, 22.VII.2001, leg. M. Schülke [C01-13E] / creek valley, 1950–2050 m, mixed deciduous forest, moss, dead wood, mushrooms (sifted) [C01-13E] / Holotypus ♂ *Lathrobium bifidum* sp. n., det. V. Assing 2012” (cSch). Paratypes: 1♂: same data as holotype (cSch); 2♂: same data, but “19.VII.2001 ... [13C]”

(cAss); 1♀: “China (Daba Shan) pass E Mt. Da Shennongjia, 12 km NW Muyuping 31°30'N, 110°21'E 1950 m (dry creek vall., mix. decid. forest) 16.–22.VII.2001 Wrase [13] (cSch); 5♂, 4♀: “CHINA: W-Hubei daba [sic] Shan pass E of Mt. Shennongjia 12 km / NW Muyuping 31°30'N 110°21'E 1950 m A. Smetana [C117]” (cSme, cAss); 1♀: same data, but “16.VII.2001 ... [C104]” (cSme); 1♂, 1♀: “CHINA: W-Hubei (Daba Shan), creek valley 11 km NW Muyuping, 31°30'N, 110°22'E, 1960 m, 18.VII.2001, leg. M. Schülke [C01-17] / creek valley, mixed deciduous forest (sifted) [C01-17]” (cSch, cAss); 5♂, 4♀: “CHINA: W-Hubei Daba Shan crk. valley 11 km NW Muyuping 31°30'N / 110°22'E 1960 m, 18.VII.2001 A. Smetana [C109]” (cSme, cAss); 1♂: “CHINA: W-Hubei, 2002, Dashennongjia mts., 2100–2900 m, 10.–14.6., 31.5N, 110.3E, leg. J. Turna” (NHMW).

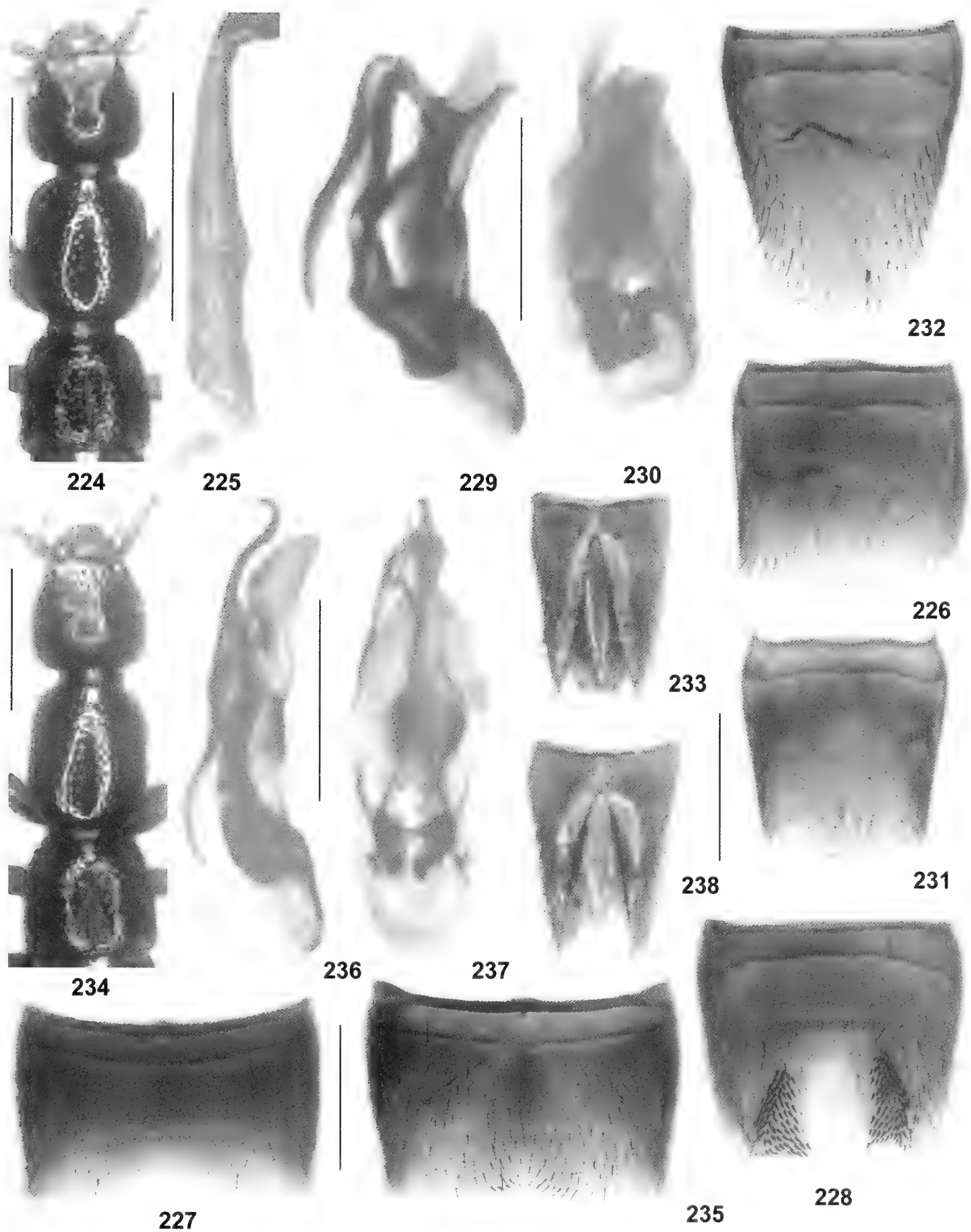
**Etymology.** The specific epithet (Latin, adjective: split into two parts) alludes to shape of the ventral process of the aedeagus.

**Description.** Size rather variable, but without sexual dimorphism; body length 6.3–7.5 mm; length of forebody 3.0–3.3 mm. Coloration: body brown to blackish-brown, elytra sometimes paler posteriorly, posterior margins of abdominal tergites narrowly dark-reddish; legs and antennae reddish.

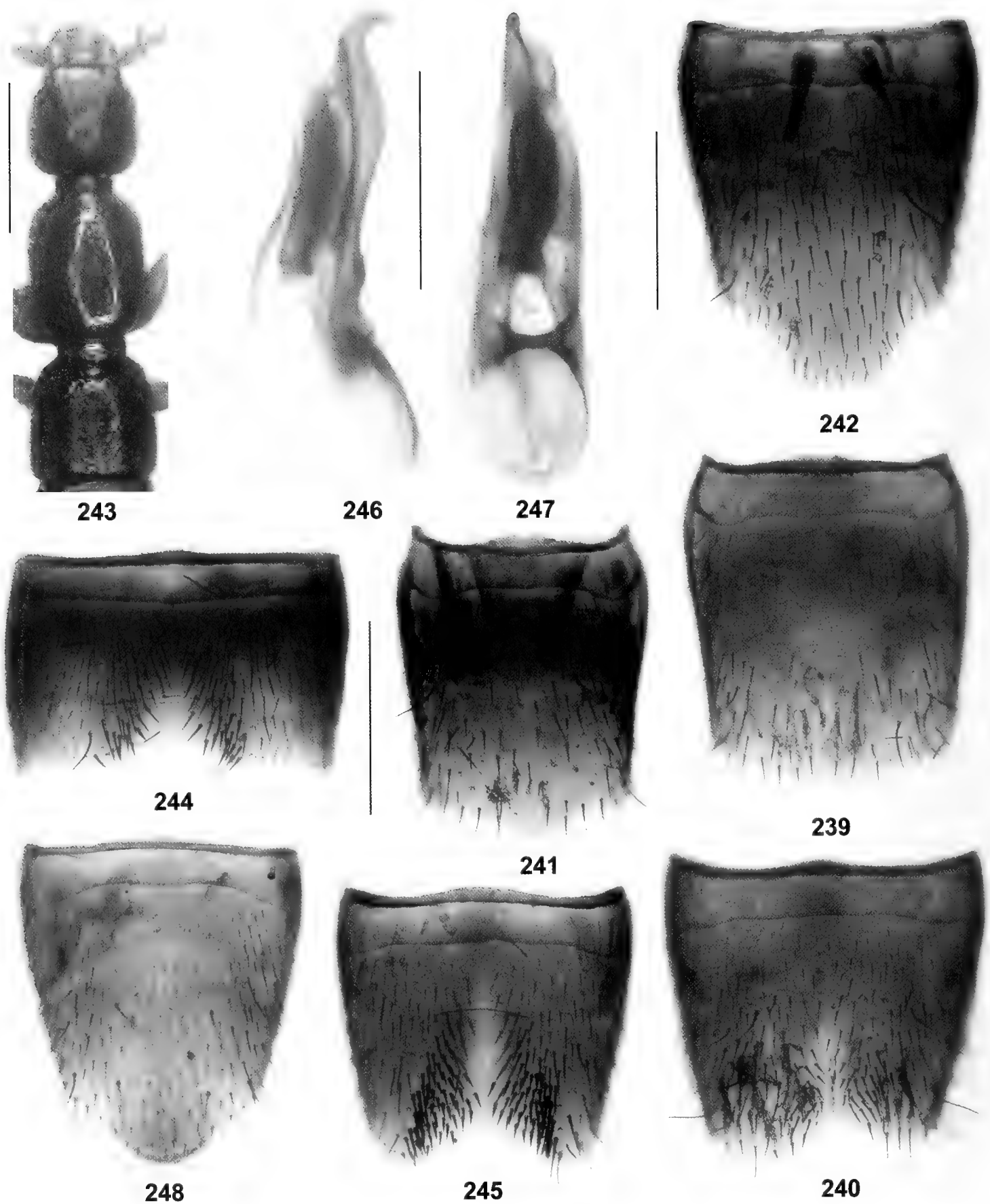
External characters (Fig. 234) as in *L. trifidum*, distinguished only by the primary and secondary sexual characters:

♂: protarsomeres I–IV strongly dilated; tergite VIII (Fig. 239) with weakly convex posterior margin; sternite VII (Fig. 235) strongly transverse, weakly depressed and with transverse row of approximately 10 weakly modified setae near the weakly concave posterior margin; sternite VIII (Fig. 240) weakly transverse and moderately asymmetric, with shallow median impression posteriorly, this impression with few modified setae on either side of the narrowly non-pubescent middle, posterior excision shallow, broad, and asymmetric; aedeagus (Figs 236–237) approximately 1.2 mm long and asymmetric; ventral process apically divided into two lamellae of different shape; dorsal plate broad in dorsal view, bisinuate in lateral view, and apically extended into conspicuous long and hook-shaped process; internal sac with dark membranous structures, but without sclerotized spines.

♀: protarsomeres I–IV dilated, but distinctly less so than in male; metatibia unmodified; tergite VIII distinctly, triangularly produced posteriorly (Fig. 241); sternite VIII (Fig. 242) approximately 1.0 mm long, oblong, posterior margin distinctly convexly produced in the middle; tergite IX anteriorly divided by suture; tergite X almost flat in anterior half, narrowly separating tergite IX anteriorly, and nearly reaching anterior margin of tergite IX (Fig. 238).



**Figs 224–238.** *Lathrobium trifidum* (224–233) and *L. bifidum* (234–238). 224, 234. Forebody. 225. Male metatibia. 226. Male tergite VIII. 227, 235. Male sternite VII. 228. Male sternite VIII. 229–230, 236–237. Aedeagus in lateral and in ventral view. 231. Female tergite VIII. 232. Female sternite VIII. 233, 238. Female tergites IX–X. Scale bars: 224, 234: 1.0 mm; 225–233, 235–238: 0.5 mm.



**Figs 239–248.** *Lathrobium bifidum* (239–242) and *L. aquilinum* (243–248). 239. Male tergite VIII. 240, 245. Male sternite VIII. 241. Female tergite VIII. 242, 248. Female sternite VIII. 243. Forebody. 244. Male sternite VII. 246–247. Aedeagus in lateral and in ventral view. Scale bars: 243: 1.0 mm; 239–242, 244–248: 0.5 mm.

**Comparative notes.** Based on the primary and secondary sexual characters (aedeagus asymmetric with the ventral process divided into lamellate lobes; male sternite VII weakly modified, with or without few weakly modified setae, posterior margin weakly concave; male sternite VIII asymmetric; tergite VIII with sexual dimorphism; female tergite VIII divided anteriorly), *L. bifidum* is most closely related to the similar *L. trifidum*. It is readily distinguished from all its congeners by the distinctive shapes and chaetotaxy of the male sternites VII and VIII, and by the conspicuous morphology of the aedeagus.

**Distribution and natural history.** The species was found in two geographically close localities in the Daba Shan, western Hubei, to the northwest of Muyuping (Fig. 213). The specimens were sifted from leaf litter and moss in deciduous forests at altitudes of 1950–2050 m, together with *L. fissispinosum* and *L. curvispinosum*.

### The *Lathrobium aquilinum* species group

#### *Lathrobium aquilinum* sp. n. (Figs 213, 243–248)

**Type material.** Holotype ♂: “CHINA: S-Shaanxi (Daba Shan), NW pass 25 km NW Zhenping, 32°01'N, 109°19'E, 2150 m, 11.VII.2001, leg. M. Schülke [C01-09] / creek valley, young coniferous forest, moss (sifted) [C01-09] / Holotypus ♂ *Lathrobium aquilinum* sp. n., det. V. Assing 2012” (cSch). Paratypes: 1♂, 3♀: same data as holotype (cSch, cAss); 1♂, 1♀: “CHINA Shaanxi Daba Shan NW pass 25 km NW Zhenping 32°01'N / 109°19'E 2150 m 11.VII.2001 A. Smetana [C99]” (cSme, cAss).

**Etymology.** The specific epithet (Latin, adjective: of an eagle) alludes to shape of the apex of the ventral process of the aedeagus, which somewhat resembles a hawk's beak.

**Description.** Size without sexual dimorphism; body length 6.3–6.7 mm; length of forebody 2.9–3.1 mm. Coloration: body dark-brown to blackish-brown; legs and antennae reddish.

Head (Fig. 243) approximately as broad as long; punctation moderately coarse and rather sparse, even sparser in median dorsal portion; interstices on average distinctly broader than punctures, with fine, but distinct microreticulation and subdued shine. Eyes moderately small, composed of > 50 ommatidia, approximately 1/3 the length of postocular region in dorsal view, and approximately 0.35–0.40 times as long as postocular region in lateral view. Antenna approximately 1.5 mm long.

Pronotum (Fig. 243) rather broad, approximately 1.2 times as long as broad and 1.05–1.10 times as broad as head; punctation similar to that of head; midline rather narrowly impunctate; interstices without microsculpture and glossy.

Elytra (Fig. 243) short, approximately 0.55–0.60 times as long as pronotum; punctation rather dense, shallow, and weakly defined; interstices without microsculpture. Hind wings completely reduced.

Abdomen with fine punctation, punctures on tergites VII and VIII only slightly sparser than on anterior tergites; interstices with distinct microsculpture and subdued shine; posterior margin of tergite VII without palisade fringe; posterior margin of tergite VIII weakly convex in both sexes.

♂: protarsomeres I–IV strongly dilated; sternite VII (Fig. 244) strongly transverse, with rather extensive median impression of triangular shape posteriorly, this impression without setae in the middle, but margined by several long and stout black setae, posterior margin weakly concave in the middle; sternite VIII (Fig. 245) almost as long as broad, with extensive median impression of triangular shape, this impression with cluster of numerous stout black setae on either side of the non-pubescent middle, posterior excision very broad and shallow; aedeagus (Figs 246–247) approximately 1.1 mm long and of distinctive shape, ventral process strongly asymmetric (ventral view) and apically hooked (lateral view); dorsal plate broadly lamellate, weakly sclerotized, apically acute, without median carina, and with very short basal portion; internal sac with dark membranous structures, but without sclerotized spine.

♀: protarsomeres I–IV dilated, but distinctly less so than in male; sternite VIII (Fig. 248) approximately 0.85 mm long, oblong, and convexly produced posteriorly, posterior portion with particularly dense micropubescence; tergite IX anteriorly divided; tergite X narrowly separating tergite IX anteriorly and reaching anterior margin of tergite IX.

**Comparative notes.** The external and sexual characters do not suggest a closer relationship with any of the species treated above. *Lathrobium aquilinum* is distinguished from all of them particularly by the male sexual characters (shape and chaetotaxy of sternites VI and VIII; morphology of the aedeagus), as well as by the morphology of the female tergites IX and X.

**Distribution and natural history.** The type locality is situated in the Daba Shan, to the northwest of Zhenping (Fig. 213). The specimens were sifted from moss in a young coniferous forest at an altitude of 2150 m, together with *L. rectispinosum*.

## UNIDENTIFIED AND UNNAMED SPECIES

Some probably undescribed species in the examined material were represented only by females. Since the male sexual characters are required for a reliable identification of *Lathrobium* species, these species remain unnamed.

### *Lathrobium* sp. 1

**Material examined.** 2♀: "CHINA: Border Shaanxi - Sichuan [now Chongqing] (Daba Shan), pass 20 km SSE Zhenping, 1700–1800 m, 31°44'N, 109°35'E, 9.VII.2001, leg. M. Schülke [C01-07] / young dry mixed forest, field edge, small creek valley, moss (sifted) [C01-07]" (cSch, cAss).

This species is similar and evidently closely related to *L. rectispinosum*. The two females are slightly larger than the type specimens of that species.

### *Lathrobium* sp. 2

**Material examined.** 1♀: "CHINA [7] - S-Gansu, mountains SE Longnan, sifted, 33°13'20"N, 105°15'10"E, 2170 m, 31.VII.2012, V. Assing" (cAss).

This species is externally similar and probably closely related to *L. biforme*, *L. lunatum*, and *L. falcatum*.

### *Lathrobium* sp. 3

**Material examined.** 1♀: "CHINA: Shaanxi, Qinling Shan, 6 km E Xunyangba, 1000–1300 m, 23.V.–13.VI.2000, leg. C. Holzschuh" (NHMW).

This species is characterized by rather large size (length of forebody: 4.7 mm), blackish coloration, coarse and dense punctation of the forebody, as well as by the rather coarse and dense punctation and the very shallow, nearly obsolete microsculpture of the abdominal tergites III–VI.

### *Lathrobium* sp. 4

**Material examined.** 1♀: "China, W Hubei, Shennongjia Nat. Res., 2000–2200 m, litter, 7.VI.95 S. Kurbatov" (MHNG).

The above specimen is externally similar to *L. aquilinum*, but, in view of the distribution, most likely to represent a different species.

## KEY TO SPECIES

The key below includes the described species of the Qinling Shan, the Daba Shan, and adjacent mountain ranges from the mountains near Songpan in northern Sichuan in the west to the eastern parts of the Daba Shan in western Hubei in the east. Since a reliable species-level identification based on external characters is usually not possible, the key primarily relies on the male sexual characters.

1. Macropterous or wing-dimorphic species; elytra at least 0.5–0.6 times as long as pronotum. Hind wings in brachypterous specimens not completely reduced (rudiments at least as long as elytra). Posterior margin of abdominal tergite VII with or without palisade fringe. .... 2
- Apterous species; elytra 0.5–0.6 times as long as pronotum. Hind wings completely reduced. Posterior margin of abdominal tergite VII always without palisade fringe. .... 3
2. Macropterous and larger species; length of forebody > 4.0 mm. Head and pronotum blackish; elytra reddish. ♂: aedeagus as figured by Koch (1939a), with long, slender, curved, and somewhat asymmetric ventral process; internal sac without conspicuously large internal structure. Widespread in the East Palaearctic: Japan, Russian Far East, North and South Korea, northern China. .... **dignum Sharp**
- Wing-dimorphic, smaller species; length of forebody approximately 2.6–3.0 mm (Figs 3–6). Pronotum reddish to reddish-brown, head mostly distinctly darker than pronotum. ♂: aedeagus with short, stout, almost straight, and in ventral view only slightly asymmetric ventral process; internal sac with conspicuously large, strongly sclerotized internal structure apically extending into a long and twisted spine (Figs 9–13); sternites VII and VIII shaped as in Figs 7–8. ♀: sternite VIII strongly oblong and with more or less strongly convex posterior margin (Fig. 15). Widespread: Gansu, Shaanxi, Sichuan, Hubei, Jiangsu (Fig. 18). .... **sinense Herman**
3. Head dorsally completely without microsculpture (Fig. 163). Tarsi conspicuously short, approximately 0.6 times as long as width of pronotum. ♂: sternite VII with two distinct and large clusters of dense modified setae (Fig. 164); sternite VIII symmetric, narrowly without pubescence in the middle, and with broad and shallow posterior excision (Fig. 165); aedeagus (Figs 166–167) approximately 1.5 mm long, with symmetric ventral process, and without sclerotized spines in internal sac. ♀: sternite VIII weakly produced posteriorly, approximately as long as broad (Fig. 168); tergite IX completely divided into two

- hemitergites. N-Sichuan: mountains to the northwest of Songpan (Fig. 111). ..... ***lentum* sp. n.**
- Head dorsally with microsculpture (sometimes nearly obsolete only in the syntopic *L. detruncatum*). Tarsi longer, > 0.6 times as long as width of pronotum. Sexual characters different. .... 4
  - 4. ♂: ventral process of aedeagus distinctly asymmetric. .... 5
  - ♂: ventral process of aedeagus symmetric, at most weakly asymmetric (ventral process turned slightly to the left or right in ventral view). .... 21
  - 5. ♂: ventral process of aedeagus apically extending into two or three lobes. Head at least as broad as long. Species from Daba Shan (including the Micang Shan). The *L. fissispinosum* group. .... 6
  - ♂: ventral process of aedeagus apically not bi- or trilobed, except for one species from the environs of Songpan in northern Sichuan with an oblong head and a strongly asymmetric male sternite VIII. .... 14
  - 6. ♂: aedeagus with conspicuously long sclerotized spine in internal sac. .... 7
  - ♂: aedeagus with dark membranous structures, but without sclerotized spine in internal sac. .... 12
  - 7. Species with or without sexual size dimorphism distributed in the Micang Shan. Coloration of body blackish or brownish. .... 8
  - Species without sexual size dimorphism distributed elsewhere in the Daba Shan. Coloration of body blackish. .... 10
  - 8. Larger species with moderately pronounced sexual size dimorphism; length of forebody: 4.2–4.5 mm (♂), 3.7–4.3 mm (♀). Colour of body blackish. Elytra with coarse and defined punctation. ♂: sternite VII with cluster of distinctly modified setae in median impression (Fig. 191); sternite VIII with very distinctive chaetotaxy and with distinct posterior excision in asymmetric position (Fig. 192); aedeagus approximately 1.5 mm long and shaped as in Figs 193–194. ♀: tergite IX undivided anteriorly (Fig. 197); tergite X longer than tergite IX in the middle, but not reaching anterior margin of tergite IX; sternite VIII as in Fig. 196. Distribution: Fig. 169. .... ***longispinosum* sp. n.**
  - Smaller species without apparent sexual size dimorphism; length of forebody < 3.5 mm. Colour of body brownish. Elytra with finer and less defined punctation. ♂: sternite VII without cluster of distinctly modified setae in median impression; sternite VIII without posterior excision, posterior margin either truncate or convex; with distinct posterior excision in asymmetric position; aedeagus smaller, approximately 1.5 mm long, and of different shape. ♀: tergite IX completely divided anteriorly; tergite X reaching anterior margin of tergite IX; sternite VIII of different shape. .... 9
  - 9. ♂: sternite VIII with convex posterior margin, approximately as long as broad (Fig. 208); ventral process of aedeagus with less acute apex in lateral view and with tooth-like process best visible in ventral view (Figs 209–210). ♀: female sternite VIII more sharply pointed posteriorly (Fig. 211). Distribution: Fig. 198. .... ***crassispinosum* sp. n.**
  - ♂: sternite VIII with truncate posterior margin, transverse (Fig. 201); ventral process of aedeagus with more acute apex in lateral view and without tooth-like process (Figs 202–203). ♀: female sternite VIII convexly produced posteriorly (Fig. 204). Distribution: Fig. 169. .... ***spinigerum* sp. n.**
  - 10. Larger species; length of forebody: 4.2–4.7 mm. ♂: sternites VII and VIII as in Figs 184–185; aedeagus larger, 1.8–1.9 mm long, shaped as in Fig. 186 and with a long curved internal spine. ♀: anterior median portion of tergite IX anteriorly shorter and with median suture (Fig. 189); sternite VIII as in Fig. 188. Western Hubei (Fig. 198). .... ***curvispinosum* sp. n.**
  - Smaller species; length of forebody 3.2–3.9 mm. ♂: shapes and chaetotaxy of sternites VII and VIII different; aedeagus smaller, 1.4–1.5 mm long and with a long internal spine of different shape. ♀: anterior median portion of tergite IX longer and without median suture; sternite VIII of different shape. .... 11
  - 11. ♂: sternite VII with more strongly modified setae (Fig. 172); sternite VIII oblong, in the middle narrowly without modified setae posteriorly (Fig. 173); aedeagus shaped as in Figs 174–175, ventral process broad and apically convex in ventral view; internal spine apically bifid. ♀: sternite VIII strongly oblong and more strongly produced posteriorly (Fig. 176); anterior median portion of tergite IX shorter. Western Hubei (Fig. 169). .... ***fissispinosum* sp. n.**
  - ♂: sternite VII with less distinctly modified setae (Fig. 178); sternite VIII approximately as long as broad, median impression with one undivided cluster of modified setae (Fig. 179); aedeagus shaped as in Figs 180–181, ventral process broad and obliquely acute in ventral view; internal spine not bifid. ♀: sternite VIII less oblong and with broadly convex posterior margin (Fig. 182); median portion of tergite IX anteriorly shorter. Shaanxi (Fig. 169). .... ***rectispinosum* sp. n.**
  - 12. Larger species; length of forebody: 3.6–4.1 mm. ♂: sternite VIII symmetric (Fig. 217); aedeagus (Figs 218–221) approximately 1.6 mm long and slender, apical lobes of ventral process of very unequal length, dorsal lobe very long and with finely serrate margins ventrally, ventral lobe much shorter and shaped like a scraper; basal portion of aedeagus small. ♀: anterior median portion of tergite IX distinctly shorter than tergite X, but anteriorly undivided, posterior processes long and slender (Fig. 223); sternite VIII

- as in Fig. 222. Shaanxi/Sichuan: Micang Shan (Fig. 213). ..... **serrilobatum** sp. n.
- Smaller species; length of forebody 2.9–3.4 mm. ♂: sternites VIII at least weakly asymmetric; aedeagus more compact and shorter, 1.1–1.2 mm long; ventral process with shorter, non-serrate apical lobes of different shapes; basal portion of aedeagus not distinctly separated from the remainder of the aedeagal capsule and not conspicuously small. ♀: tergite IX completely divided. Species from more eastern parts of the Daba Shan. .... 13
13. ♂: metatibia modified, angularly dilated approximately in the middle (Fig. 225); sternite VIII in posterior half with extensive semitransparent median portion without setae, on either side of this portion with cluster of strongly modified short and stout black setae, posterior margin convex in the middle (Fig. 228); aedeagus (Figs 229–230) with ventral process apically subdivided into three lobes of characteristic shape; dorsal plate apically not extended into a long hooked spine. ♀: sternite VIII moderately produced posteriorly, with strongly convex posterior margin (Fig. 234). Shaanxi/Chongqing (Fig. 198).  
..... **trifidum** sp. n.
- ♂: metatibia unmodified; sternite VIII (Fig. 240) in posterior half without semitransparent portion, on either side of the narrowly non-pubescent middle with a cluster of moderately modified setae, posterior margin with excision in asymmetric position; aedeagus (Figs 236–237) with ventral process apically subdivided into two lobes of characteristic shape; dorsal plate apically extended into a conspicuous long and hook-shaped spine. ♀: sternite VIII with strongly produced posterior margin, middle of this projection almost truncate (Fig. 242). Western Hubei (Fig. 213).  
..... **bifidum** sp. n.
14. Small species, length of forebody 2.5–2.8 mm. Head at least as broad as long (Fig. 72). Abdomen with relatively sparse punctation. ♂: aedeagus slender, with long and slender, distinctly asymmetric ventral process, without spine in internal sac (Figs 75–76); sternite VII unmodified (Fig. 73); sternite VIII very weakly modified, symmetric, weakly oblong, with convex posterior margin without median excision, and with unmodified pubescence (Fig. 74). ♀: anterior median portion of tergite IX undivided and short, distinctly shorter than tergite X; sternite VIII oblong, posterior margin convexly produced in the middle (Fig. 78). Qinling Shan (Fig. 70).  
..... **effeminatum** sp. n.
- Similarly small or larger species; if similarly small, with oblong head and dense punctation of the abdomen. ♂: aedeagus with short spine in internal sac; sternite VIII asymmetric, with (asymmetric) posterior excision, and with modified pubescence; sternite VII modified. ♀: tergite IX broadly undivided anteriorly and with short posterior processes. The *L. gansuense* group. .... 15
15. Smaller species; length of forebody 2.5–2.8 mm. Legs of pale coloration (usually dark-yellowish). Qinling Shan (Gansu and Shaanxi provinces). ♂: aedeagus smaller, < 1.1 mm long, with shorter and relatively broader ventral process, and with apically more or less wrench-shaped spine in internal sac. .... 16
- Larger species; length of forebody 2.8–3.5 mm. Legs mostly of darker coloration. ♂: aedeagus distinctly larger, at least 1.2 mm long, with longer and more slender ventral process, and with mostly forked spine in internal sac. .... 18
16. ♂: sternite VIII strongly asymmetric and with deeper posterior excision (Fig. 29); aedeagus with longer sclerotized spine in internal sac and ventral process of characteristic shape (Figs 30–31); sternite VII as in Fig. 28. ♀: unknown. Taibai Shan (Shaanxi) (Fig. 42). .... **declive** sp. n.
- ♂: sternite VIII less strongly asymmetric, posterior margin with broad and asymmetric posterior excision; sclerotized spine of aedeagus shorter; ventral process of different shape. .... 17
17. ♂: aedeagus slightly larger, approximately 1.0 mm long, and with apically convex dorsal plate in dorsal view (Figs 35–37); sternites VII and VIII as in Figs 33–34. ♀: sternite VIII as in Fig. 38. Taibai Shan and environs (Shaanxi) (Fig. 42).  
..... **shaanxiense** Chen et al.
- ♂: aedeagus slightly smaller, approximately 0.9 mm long, and with apically spine-like dorsal plate both in dorsal and in lateral view (Figs 22–23); sternites VII and VIII as in Figs 20–21. ♀: sternite VIII as in Fig. 25. Environs of Lazikou pass, western Qinling Shan (Gansu) (Fig. 42). .... **gansuense** sp. n.
18. Coloration paler: forebody reddish; abdomen brown; legs pale-reddish. ♂: sternite VIII and aedeagus as in Figs 39–41. Shaanxi: Qinling Shan: Taibai Shan.  
..... **heteromorphum** Chen et al.
- Coloration darker: body blackish-brown to blackish; legs brown to dark-brown. ♂: sternite VIII of different shape and chaetotaxy; aedeagus of different morphology. Mountains in northern Sichuan (environs of Songpan). .... 19
19. Head with shallow but distinct microsculpture. ♂: sternite VIII less strongly modified, posterior excision broad and asymmetric (Fig. 45); aedeagus longer, 1.4–1.5 mm long, with lamellate, bilobed, apically not acute ventral process (Figs 46–50); sternite VII as in Fig. 44. ♀: sternite VIII more narrowly produced posteriorly (Figs 51–52). Distribution: Fig. 42.  
..... **biapicale** sp. n.
- Head with often indistinct and almost obsolete microreticulation. ♂: sternite VIII more strongly mod-

- ified, posterior excision deep, asymmetric and bisinuate; aedeagus shorter, approximately 1.2 mm long, with apically acute and non-bilobed ventral process. ♀: sternite VIII less strongly and more broadly produced posteriorly. .... 20
20. ♂: sternite VII more strongly asymmetric, posterior margin distinctly concave in the middle (Fig. 64); sternite VIII as in Fig. 65; aedeagus with apically more slender (ventral view) and narrowly truncate (lateral view) ventral process (Figs 66–67). ♀: sternite VIII only indistinctly oblong, posterior margin weakly concave in the middle (Fig. 68). Distribution: Fig. 18. .... ***brevisternale* sp. n.**
- ♂: sternite VII less strongly asymmetric, posterior margin weakly concave in the middle (Fig. 56); sternite VIII as in Fig. 57; aedeagus with apically broader (ventral view) and acute (lateral view) ventral process (Figs 58–59). ♀: sternite VIII distinctly oblong, posterior margin convexly produced in the middle (Fig. 61). Distribution: Fig. 18. .... ***detruncatum* sp. n.**
21. Pronotum broad, approximately 1.2 times as long as broad (Fig. 243). Rather small species; length of forebody: 2.9–3.1 mm. Coloration of body brown. ♂: aedeagus with relatively short and bisinuate (lateral view) ventral process (Figs 246–247); sternites VII and VIII distinctly modified (Figs 244–245). ♀: tergite IX completely divided in the middle; tergite X reaching anterior margin of tergite IX; sternite VIII shaped as in Fig. 248. Western Hubei: Daba Shan (Fig. 213). .... ***aquilinum* sp. n.**
- Pronotum more slender, at least approximately 1.25 times as long as broad. Coloration of body often darker. ♂: aedeagus with relatively longer and more or less curved (lateral view) ventral process; sternites VII and VIII usually more weakly modified. ♀: anterior median portion of tergite IX undivided in the middle, at least nearly as long as tergite X; tergite X not reaching anterior margin of tergite IX. The *L. varisternale* species group. Unknown from western Hubei. .... 22
22. ♂: ventral process of aedeagus apically strongly hooked. Gansu. .... 23
- ♂: ventral process of aedeagus not hooked apically. .... 24
23. Larger species with pronounced sexual size dimorphism; length of forebody 3.6–4.0 mm (♂), 3.2–3.5 mm (♀). ♂: aedeagus larger, 1.4–1.5 mm long and more strongly sclerotized, shaped as in Figs 90–91; sternite VIII with distinct and deep posterior excision, and with distinctly modified pubescence (Fig. 89); sternite VII as in Fig. 88. ♀: sternite VIII as in Fig. 92; apex of abdomen with conspicuous dark amorphous structure in ventral view (Fig. 93). Western Qinling Shan (Fig. 70). .... ***biforme* sp. n.**
- Smaller species without sexual size dimorphism; length of forebody 3.0–3.5 mm. ♂: ventral process smaller, approximately 1.3 mm long, and less strongly sclerotized (Fig. 159); sternite VIII weakly modified, with very small posterior excision and with weakly modified pubescence (Fig. 160); sternite VII as in Fig. 158. ♀: sternite VIII as in Fig. 161; apex of abdomen without conspicuous dark amorphous structure in ventral view. Mountains to the southeast of Longnan (Fig. 111). .... ***inflexum* sp. n.**
24. Body usually blackish, rarely dark-brown. ♂: ventral process of aedeagus more or less sickle-shaped (exception: *L. varisternale*). ♀: abdominal apex ventrally with more or less strongly sclerotized amorphous sclerite. Qinling Shan: Gansu and SW-Shaanxi (west of 107°30'E longitude). .... 25
- Coloration of body brown to dark-brown. ♂: ventral process weakly curved and not distinctly compressed laterally (not sickle-shaped) or conspicuously straight. ♀: abdominal apex ventrally without distinctly sclerotized amorphous sclerite. Species of more eastern distribution (Shaanxi), absent from Gansu. .... 28
25. ♂: ventral process of aedeagus longer, more slender, and not distinctly sickle-shaped (Fig. 84); sternites VII and VIII as in Figs 80–83. ♀: sternite VIII as in Fig. 86. Qinling Shan: Shaanxi (Fig. 70). .... ***varisternale* sp. n.**
- ♂: ventral process of aedeagus shorter, less slender in lateral view, and somewhat sickle-shaped. Species distributed in Gansu. .... 26
26. ♂: sternite VII with indistinctly concave posterior margin (Fig. 106); sternite VIII with ill-defined clusters of not very dense black setae on either side of the narrowly non-pubescent middle (Fig. 107); aedeagus as in Fig. 108. ♀: sternite VIII as in Fig. 109. Min Shan (Fig. 111). .... ***minicum* sp. n.**
- ♂: sternite VII with distinctly concave posterior margin; sternite VIII with more defined clusters of denser black setae on either side of the middle; aedeagus with ventral process of different shape. Western Qinling Shan. .... 27
27. ♂: ventral process of aedeagus longer and more strongly curved in lateral view (Fig. 97); sternites VII and VIII as in Figs 95–96. ♀: sternite VIII almost acutely produced posteriorly (Fig. 98). Distribution: Fig. 70. .... ***lunatum* sp. n.**
- ♂: ventral process of aedeagus shorter and less strongly curved in lateral view (Fig. 103); sternites VII and VIII as in Figs 101–102. ♀: unknown. Distribution: Fig. 111. .... ***falcatum* sp. n.**
28. ♂: apical half of ventral process of aedeagus conspicuously straight, slender, and acute in lateral view; ster-

- nite VIII with pubescence in the middle and with rather deep posterior excision. ♀: unknown. Qinling Shan: environs of Huoditang.  
..... **mawenliae** Peng & Li
- ♂: ventral process of aedeagus curved in lateral view; sternite VIII narrowly without pubescence at least in posterior half and with smaller posterior excision.  
..... 29
  - 29. ♂: sternite VIII as in Fig. 150, narrowly non-pubescent only in posterior half; postero-median impression of sternite VII without setae in the middle (Fig. 149); aedeagus shaped as in Figs 151–154. ♀: tergite VIII with weakly concave posterior margin; tergite X roof-shaped, i.e., distinctly angled in cross-section, distinctly shorter than tergite IX in the middle (Fig. 156); sternite VIII shaped as in Fig. 155. Tergite VIII with sexual dimorphism. Distribution: Fig. 169.  
..... **tectiforme** sp. n.
  - ♂: sternites VII and VIII of different chaetotaxy; aedeagus with ventral process of slightly different shape, dorsal plate often with less pronounced basal portion. ♀: posterior margin of tergite VIII truncate to weakly convex; tergite X not roof-shaped in cross-section, strongly convex at most, and in most species relatively longer. .... 30
  - 30. Body of reddish to pale reddish-brown coloration. ♂: sternites VII and VIII narrowly non-pubescent in the middle (Figs 120–121); sternite VIII with almost obsolete posterior excision and with rather defined cluster of black setae on either side of middle (Fig. 121); aedeagus relatively small, approximately 1.0 mm long, apical and basal portion of dorsal plate not forming a distinct angle in lateral view (Fig. 122). ♀: tergite X approximately as long as tergite IX in the middle, or slightly shorter; sternite VIII moderately produced posteriorly (Fig. 124). Distribution: Fig. 42.  
..... **sociabile** sp. n.
  - Body in mature specimens of more or less dark-brown coloration. ♂: sternites VII and VIII of different chaetotaxy; aedeagus with ventral process and dorsal plate of different shape. ♀: sternite VIII often more produced posteriorly. .... 31
  - 31. ♂: aedeagus (Figs 129–132) larger, 1.4–1.5 mm long, with long and slender ventral process; basal portion of dorsal plate distinctly sclerotized, relatively long, and forming a distinct angle with apical portion in lateral view; sternites VII and VIII as in Figs 126–128. ♀: tergite X shorter than tergite IX in the middle; sternite VIII approximately 1.2 mm long, strongly and narrowly produced posteriorly (Figs 133–135). Distribution: Fig. 111. .... **brevitergale** sp. n.
  - ♂: aedeagus smaller, approximately 1.3 mm long at most and with less slender ventral process in lateral view; dorsal plate mostly relatively shorter, less strongly sclerotized and forming a more obtuse angle, or no angle at all, with apical portion in lateral view; sternites VII and VIII of slightly different chaetotaxy. ♀: tergite X at least approximately as long as tergite IX in the middle; sternite VIII less strongly and narrowly produced posteriorly. .... 32
  - 32. ♂: aedeagus with ventral process basally stouter; dorsal plate without distinct basal portion (Figs 115–117); sternites VII and VIII as in Figs 113–114. ♀: tergite X slightly longer than tergite IX in the middle; sternite VIII approximately 1.0 mm long, shaped as in Fig. 118. Hua Shan (Fig. 111). .... **huaense** sp. n.
  - ♂: aedeagus with ventral process more slender basally; dorsal plate with distinct basal portion. ♀: tergite X approximately as long as tergite IX in the middle. Distribution more western. .... 33
  - 33. ♂: ventral process slightly shorter than basal portion of aedeagus, basal portion of dorsal plate more strongly sclerotized and forming an obtuse angle with apical portion (Fig. 139); posterior impression of sternite VII without setae in the middle (Fig. 137); sternite VIII with more defined cluster of black setae on either side of middle (Fig. 138). ♀: sternite VIII as in Fig. 141. Distribution: Fig. 70.  
..... **brevilobatum** sp. n.
  - ♂: ventral process approximately as long as basal portion of aedeagus, basal portion of dorsal plate weakly sclerotized and not forming an angle with apical portion (Fig. 145); posterior impression of sternite VII with setae in the middle (Fig. 143); sternite VIII with less defined cluster of black setae on either side of middle (Fig. 144). ♀: sternite VIII as in Fig. 147. Distribution: Fig. 42. .... **concameratum** sp. n.

## AN ADDITIONAL RECORD OF *LATHROBIUM* FROM CHINA

### *Lathrobium wuesthoffi* Koch, 1939

**Material examined. China:** 14 exs., Beijing, Yan Shan, Dongling Mts., Xiaolongmen, 1400 m, 15.–16.VI.2001, leg. Hlaváč & Cooter (cAss, cSch); 3 exs., Hebei/Nei Mongol, pass Chengde-Chifeng, “41.6N 118.2E”, 30.–31.V.2002, leg. Turna (NHMW, cAss). **Russia:** 2 exs., Ussuri mountain range, Nikolsk Ussuriysk, leg. Mandl (NHMW, cAss); 1 ex., Birskeye, 26.VI.1958 (NHMW); 1 ex., Ussuri, Maritime Territory, Dove Hill near Hasan, 5.–8.VII.1990, leg. Kasantsev (NHMB).

**Comment.** The above specimens from Beijing and Hebei/Nei Mongol represent the first records from China. The aedeagus of one of the males from Beijing is teratologically malformed. For illustrations of the aedeagus see Koch (1939b).

# CHECKLIST OF THE *LATHROBIUM* SPECIES OF MAINLAND CHINA AND TAIWAN

Including the newly described species, *Lathrobium* is now represented in mainland China by 89 and in Taiwan by 13 described species.

Five species, *L. fulvipenne* Gravenhorst, 1806, *L. kobense* Sharp, 1874, *L. lineatocolle* Scriba, 1859, *L. monilicorne* Sharp, 1889, and *L. pollens* Sharp, 1889, are excluded from the *Lathrobium* fauna of China and omitted from the checklist. Previous records of these species from Chinese territory are most likely based on misidentifications and confusion with externally similar species, e.g., *L. fulvipenne* and *L. lineatocolle* with *L. wuesthoffi*

and/or *L. dignum*. *Lathrobium kobense*, *L. monilicorne*, and *L. pollens* were all described from Japan, and their records from China are based neither on a revision of types nor on a study of the male sexual characters. Moreover, *Lathrobium pollens* is a micropterous and probably locally endemic species.

*Lathrobium sinense* was recently doubtfully recorded also from Yunnan (Hua 2002, Peng et al. 2012a). However, since the type material of *L. sinense* had not been revised, it seems most unlikely that the material was identified correctly. At present, the species has reliably been recorded only from Gansu, Shaanxi, Sichuan, Hubei, and Jiangsu.

**Table 1.** Checklist of the *Lathrobium* species of mainland China and Taiwan.

Species	Distribution in mainland China and Taiwan
<i>acutissimum</i> Peng, Li & Zhao, 2012	Sichuan: Jiajin Shan
<i>ailaoshanense</i> Watanabe & Xiao, 1997	Yunnan: Ailao Shan
<i>alesi</i> Assing, 2010	Taiwan: Hsueh Shan
<i>alishanum</i> Assing, 2010	Taiwan: Alishan
<i>anmaicum</i> Assing, 2010	Taiwan: Anmashan
<i>aokii</i> Watanabe & Xiao, 2000	Yunnan: Diancang Shan
<i>aquilinum</i> sp. n.	Shaanxi: Daba Shan
<i>baihualingense</i> Watanabe & Xiao, 2000	Yunnan: Gaoligong Shan
<i>baishanzuense</i> Peng & Li, 2012	Zhejiang: Baishanzu
<i>aizuorum</i> Watanabe & Xiao, 2000	Yunnan: Diancang Shan
<i>biapicale</i> sp. n.	Sichuan: Songpan env.
<i>bifidum</i> sp. n.	Hubei: Daba Shan
<i>biforme</i> sp. n.	Gansu: Qinling Shan
<i>brevilobatum</i> sp. n.	Shaanxi: Qinling Shan
<i>brevisternale</i> sp. n.	Sichuan: Min Shan
<i>brevitergale</i> sp. n.	Shaanxi: Qinling Shan
<i>concameratum</i> sp. n.	Shaanxi: Qinling Shan
<i>cooteri</i> Watanabe, 1999	Zhejiang: Linglong Shan
<i>crassispinosum</i> sp. n.	Shaanxi/Sichuan: Micang Shan
<i>curvispinosum</i> sp. n.	Hubei: Daba Shan
<i>cylindricum</i> Bernhauer, 1938	Jiangsu: Chinkiang
<i>dabeiense</i> Watanabe & Xiao, 1997	Yunnan: Gaoligong Shan
<i>daliense</i> Watanabe & Xiao, 1994	Yunnan: Diancang Shan
<i>daocongchaoi</i> Peng & Li, 2012	Fujian: Wuyi Shan
<i>dayaoshanense</i> Peng & Li, 2012	Guangxi: Dayaoshan
<i>declive</i> sp. n.	Shaanxi: Qinling Shan: Taibai Shan
<i>detruncatum</i> sp. n.	Sichuan: Songpan env.
<i>dignum</i> Sharp, 1874	Hubei, Jiangsu, Liaoning, Gansu?, Shaanxi?
<i>effeminatum</i> sp. n.	Shaanxi: Qinling Shan
<i>extraculum</i> Assing, 2010	Taiwan: Peitawushan
<i>falcatum</i> sp. n.	Gansu: Qinling Shan
<i>fissispinosum</i> sp. n.	Hubei: Daba Shan
<i>follitum</i> Assing, 2010	Taiwan: Peitawushan
<i>fujianense</i> Peng & Li, 2012	Fujian: Junzifeng Shan
<i>gansuense</i> sp. n.	Gansu: Qinling Shan
<i>guizhouense</i> Chen, Li & Zhao, 2005	Guizhou: Fanjing Shan
<i>hailuogouense</i> Peng, Li & Zhao, 2012	Sichuan: Gongga Shan
<i>heteromorphum</i> Chen, Li & Zhao, 2005	Shaanxi: Qinling Shan
<i>houhuanicum</i> Assing, 2010	Taiwan: Houhuanshan
<i>huaense</i> sp. n.	Shaanxi: Qinling Shan: Hua Shan
<i>hunanense</i> Watanabe, 2011	Hunan: Zhangjiacao
<i>imadatei</i> Watanabe, 1992	Zhejiang: Wuyanling
<i>immanissimum</i> Peng & Li, 2012	Zhejiang: Baishanzu

**Table 1.** Checklist of the *Lathrobium* species of mainland China and Taiwan (continued).

Species	Distribution in mainland China and Taiwan
<i>inflexum</i> sp. n.	Gansu: mountains SE Longnan
<i>involutum</i> Assing, 2010	Taiwan: Hseuhshan
<i>ishiiianum</i> Watanabe & Xiao, 2000	Yunnan: Gaoligong Shan
<i>itohi</i> Watanabe & Xiao, 2000	Yunnan: Gaoligong Shan
<i>jingyuetanicum</i> Li & Chen, 1990	Jilin: Jingyuetan
<i>jiulongshanense</i> Peng & Li, 2012	Zhejiang: Jiulong Shan
<i>jizushanense</i> Watanabe & Xiao, 1997	Yunnan: Jizu Shan
<i>kishimotoi</i> Watanabe, 2011	Hunan: Zhangjiacao
<i>labahense</i> Peng, Li & Zhao, 2012	Sichuan: Labahe
<i>lentum</i> sp. n.	Sichuan: Songpan env.
<i>lijiangense</i> Watanabe & Xiao, 1997	Yunnan: Yulongxue Shan
<i>lingae</i> Peng, Li & Zhao, 2012	Zhejiang: Longwang Shan
<i>lobrathiforme</i> Assing, 2012	Yunnan: Gaoligong Shan
<i>lobrathioides</i> Assing, 2012	Chongqing: Jinpo Shan
<i>longispinosum</i> sp. n.	Shaanxi/Sichuan: Micang Shan
<i>longwangshanense</i> Peng, Li & Zhao, 2012	Zhejiang: Longwang Shan
<i>lunatum</i> sp. n.	Gansu: Qinling Shan
<i>maoershanense</i> Peng & Li, 2012	Guangxi: Maoer Shan
<i>mawenliae</i> Peng & Li, 2013	Shaanxi: Qinling Shan
<i>miaoershanum</i> Watanabe, 2011	Guangxi: Maoer Shan
<i>minicum</i> sp. n.	Gansu: Min Shan
<i>naxii</i> Watanabe & Xiao, 1996	Yunnan: Yulongxue Shan
<i>nenkaoicum</i> Assing, 2010	Taiwan: Nenkaoshan
<i>obstipum</i> Peng & Li, 2012	Zhejiang: Baishanzu
<i>pilosum</i> Peng & Li, 2012	Zhejiang: Baishanzu
<i>proprium</i> Peng & Li, 2012	Guangxi: Maoer Shan
<i>rectispinosum</i> sp. n.	Shaanxi: Daba Shan
<i>rougemonti</i> Watanabe, 1999	Zhejiang: Tianmu Shan
<i>semistriatum</i> Scheerpeltz, 1962	Shandong: Tai Shan
<i>serrilobatum</i> sp. n.	Shaanxi/Sichuan: Micang Shan
<i>shaanxiense</i> Chen, Li & Zhao, 2005	Shaanxi: Qinling Shan
<i>shaolaiense</i> Watanabe, 1998	Taiwan: Ta-hsüeh Shan
<i>shengtangshanense</i> Peng & Li, 2012	Guangxi: Shengtang Shan
<i>sheni</i> Peng & Li, 2012	Zhejiang: Jiulong Shan
<i>shuheii</i> Watanabe & Xiao, 2000	Yunnan: Gaoligong Shan
<i>sinense</i> Herman, 2003	Gansu, Shaanxi, Sichuan, Hubei, Jiangsu
= <i>chinense</i> Bernhauer, 1938	
<i>sociabile</i> sp. n.	Shaanxi: Qinling Shan
<i>spinigerum</i> sp. n.	Shaanxi: Micang Shan
<i>tamurai</i> Watanabe, 1992	Zhejiang: Wuyanling
<i>tangi</i> Peng & Li, 2012	Zhejiang: Baishanzu
<i>tarokoense</i> Assing, 2010	Taiwan: Taroko N. R.
<i>tectiforme</i> sp. n.	Shaanxi: Qinling Shan
<i>tianmushanense</i> Watanabe, 1999	Zhejiang: Tianmu Shan, Longwang Shan
<i>trifidum</i> sp. n.	Shaanxi/Chongqing: Daba Shan
<i>tsuifengense</i> Watanabe, 2005	Taiwan: Tsuifeng
<i>uncum</i> Peng, Li & Zhao, 2012	Zhejiang: Longwang Shan
<i>utriculatum</i> Assing, 2010	Taiwan: Peinantashan
<i>varisternale</i> sp. n.	Shaanxi: Qinling Shan
<i>watanabei</i> Schülke, 2002	Sichuan: Daxue Shan
<i>wuesthoffi</i> Koch, 1939	Beijing; Hebei/Nei Mongol
<i>xiei</i> Watanabe & Xiao, 2000	Yunnan: Gaoligong Shan
<i>yasutoshii</i> Watanabe, 2005	Taiwan: Lishan
<i>yinae</i> Watanabe & Xiao, 1997	Yunnan: Yulongxue Shan
<i>yulongense</i> Peng & Li, 2012	Yunnan: Yulongxue Shan
<i>yunnanum</i> Watanabe & Xiao, 1994	Yunnan: Diancang Shan: Laohu Shan
<i>zhangdinghengi</i> Peng, Li & Zhao, 2012	Guangxi: Huaping Nature Reserve
<i>zhangii</i> Watanabe & Xiao, 1997	Yunnan: Jizu Shan
<i>zhaotixiongi</i> Peng, Li & Zhao, 2012	Zhejiang: Jiulong Shan, Majian
<i>zhujianqingi</i> Peng & Li, 2012	Guangxi: Maoer Shan

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## New fossil species of *Ragas* Walker (Diptera: Empididae) in Baltic amber (Tertiary, Eocene)

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**Abstract.** Five species of *Ragas* from Baltic amber are described (*R. baltica* sp. nov., *R. electrica* sp. nov., *R. eocenica* sp. nov., *R. succinea* sp. nov., *R. ulrichi* sp. nov.). These are the first definitive fossil species of *Ragas* described. A key to species is provided and relationships of the fossil taxa to extant species are discussed.

**Key words.** Diptera, Empididae, *Ragas*, new species, Baltic amber.

### INTRODUCTION

*Ragas* Walker (Diptera: Empididae) is a small, rarely collected genus, and includes six described extant species (Sinclair & Saigusa 2001). *Ragas* is assigned to a primitive empidoid clade (*Ragas* group), which also includes *Zanclotus* Wilder, *Dipsomyia* Bezzi, *Hydropeza* Sinclair, and *Hormopeza* Zetterstedt (Sinclair 1999; Sinclair & Cumming 2006). Support for the monophyly of this genus group is based on the apomorphic similarities of the phallus, a stout and posteriorly arched labrum present in at least females, and an apical epipharyngeal comb (Sinclair 1999). This clade was assigned as *incertae sedis* within the family Empididae (Sinclair & Cumming 2006), but was not raised to subfamily level due to uncertainties concerning the definition of the Empididae. In molecular phylogenetic studies, the genus *Hormopeza* was assigned along with several other genera as sister to the remaining Empididae (Moulton & Wiegmann 2007).

Adults of the European species, *R. unica* Walker, have been observed clustered and mating on tree trunks, about one metre above the ground (Collin 1961; Qvick 1985). These observations were made in a small hardwood woodlot, surrounded by cultivated fields, lawns and gardens (Qvick 1985). This tree trunk behaviour likely explains why the empidid species described in the present study have been found in Baltic amber.

A first fossil species of *Ragas* in Baltic amber (*Ragas generosa*) was described by Meunier (1908), but this species was subsequently transferred to a possible new genus (Sinclair & Saigusa 2001). In the revision of extant species of *Ragas*, Sinclair & Saigusa (2001) briefly mentioned the discovery of two congeneric species from Baltic amber. In this study these species, along with additional material of species of *Ragas* in amber, are described and

illustrated. These specimens represent the first definitive fossil species of *Ragas* and their relationships to extant species are discussed.

### MATERIALS AND METHODS

The pieces will be deposited in the amber collection of Dr. Hans Ulrich at the Zoologisches Forschungsmuseum A. Koenig (ZFMK), Bonn, Germany and the Hoffeins amber collection (CCHH) of the Senckenberg Deutsches Entomologisches Institut (SDEI), Müncheberg, Germany. Amber pieces in the Hoffeins collection with *Ragas* inclusions were selected from material purchased from different sources over a period of 20 years. Dr. Ulrich obtained amber specimens exclusively from Dr. Andrey Krylov (Sea Venture Bureau Ltd., Kaliningrad, Russia) who offered inclusions sorted to Empidoidea.

Amber pieces from the ZFMK collection were prepared for identification as follows: the amber was cut and polished using an IsoMet® Low Speed Saw (Buehler, Lake Bluff, Illinois, USA) cutting machine and a Phoenix® Beta Grinder-Polisher (Buehler) polishing machine with SiC grinding paper for metallography, grit 800, 1200 and 2500, Microcut® Abrasive Paper (Buehler) plain backing P 4000, and paperboard. To protect holotype of the new species the piece was embedded in synthetic resin Araldite® 2020 (XW396/XW397) (Huntsman Advanced Materials, Everberg, Belgium) (Sinclair 2010). Specimens from the Hoffeins collection were treated in a similar way and embedded in GTS-polyester resin (Voss Chemie) (Hoffeins 2001).

Photographs (Figs 2–4) were taken with a Nikon Coolpix 4500 digital camera attached to Wild M3Z and Leica DMLS stereo-microscopes. Photographs were edited with IrfanView and Photoshop. Photographs (Figs 1, 5, 6) were taken with a Canon EOS 40D digital camera using a 65mm 1–5x macro lens and ring LED lighting. Multiple images were staked and montaged using Auto-Montage by Syncrosopy and edited with Photoshop.

Terms used for adult structures follow McAlpine (1981), Stuckenberg (1999 – antennae), and Saigusa (2006 – wing venation). In the system outlined by Saigusa (2006), the dipteran vein  $A_1$  (as used in McAlpine 1981) is homologized with the mecopteran CuP, and consequently Cu $A_1$  (of McAlpine) is termed  $M_4$ , Cu $A_2$  is CuA, the anal cell is cell cua, and the anal vein ( $A_1$ +Cu $A_2$ ) is CuP+CuA. Homologies of the male terminalia follow Sinclair and Cumming (2006).

### Genus *Ragas* Walker

*Ragas* Walker, 1837: 229. Type-species: *Ragas unica* Walker (monotypy).

*Rhagas* Agassiz, 1847: 320. Unjustified emendation.

**Diagnosis.** *Ragas* is defined by short spine-like setae on the postgena, fore coxa and trochanter, recurved labrum, and subapical laterally projected surstylus (Sinclair & Saigusa 2001).

### *Ragas baltica* sp. nov. (Figs 7, 8)

**Type material.** **Holotype** female in Baltic amber, with following label data: “HOLOTYPE/ *Ragas/ baltica/* Sinclair & Hoffeins”; “CCHH 1458–2” (SDEI).

Amber with inclusion embedded in a rectangular polyester block 16x10x4 mm; inclusion badly preserved, left side totally milky, wings in resin layer, venation partly obscured, surface of body lacerated and thus chaetotaxy of mesonotum difficult to detect. Syninclusion: stellate hair.

**Recognition.** This species is distinctive with four setae near the base of the fore femur.

**Description. Female.** Body length 2.4 mm, wing length approximately 2.5 mm. **Head:** Dark brown. Dichoptic, bare. Frons at inner margin of eye with three setulae; ocellar triangle dorsal, with pair of short anterior ocellar setae and shorter and weaker posterior pair; two long vertical setae; occiput with scattered short setae. Postgena with cluster of black, spine-like setae. Proboscis with labrum strongly bent backwards, as long as width of eye, with tip nearly touching fore coxa. Antennal postpedicel bulbous and tapered apically (Fig. 7), stylus 2-segment-

ed with short, apical sensillum; length of stylus two-thirds length of postpedicel. **Thorax:** Dark brown. Two notopleurals, one supra-alar, one postalar, acrostichals present, seven dorsocentrals, anterior setae stronger and longer than posterior setae; apical setae on scutellum visible. **Wing:** Radial fork present, V-shaped. **Legs:** Brown. Anterior face of fore coxa with rows of irregularly arranged, strong, erect black setae of nearby equal length; trochanter with ten strong, black spine-like setae, varying in length, lowermost longer than width of femur; fore femur with four stout setae near base, of equal length, as long as width of femur (Fig. 8), 4th seta shorter than preceding, apex slightly bent downwards; fore tibia with row of anterior and posterior short setae, bent downwards, and with interadjacent erect micro-setulae; mid and hind femora lacking outstanding setae; mid tibia with short, regularly arranged setae; hind tibia with row of anterior and posterior short setae, bent downwards, and with interadjacent erect micro-setulae. Apical tibial comb present on fore and hind tibiae. **Terminalia:** Obscured by wings.

**Etymology.** The specific name is in reference to the geographic origin of the amber species, the Baltic region.

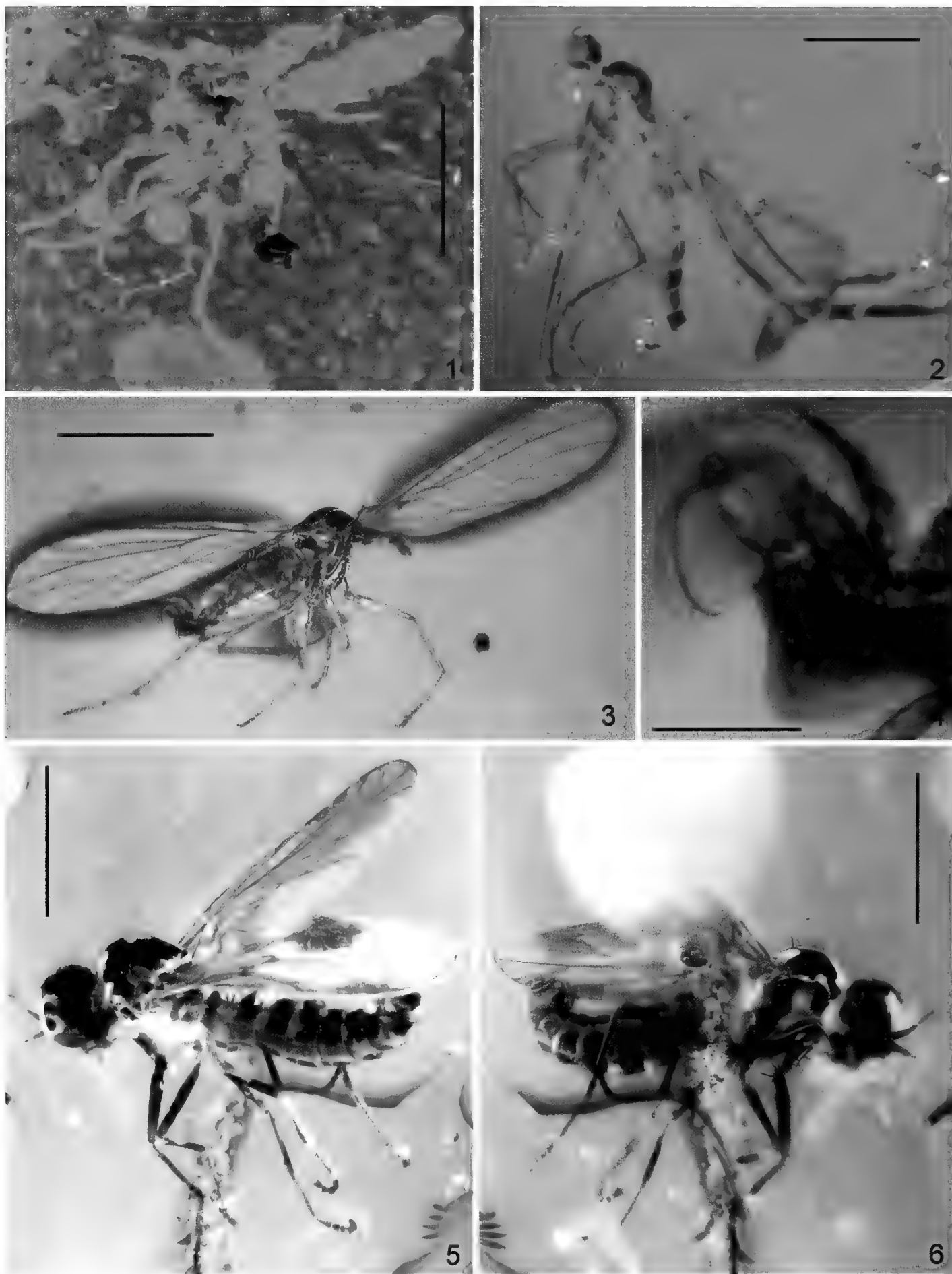
**Remarks.** This female specimen in Baltic amber is apparently not conspecific with any known species, recognized by the spine-like setae of the postgena, fore coxa and fore femur, and V-shaped radial fork. Describing a new species based on a single female is problematic. The chances of discovering a male with the same combination of characters present as in the female are a matter of coincidence. If a male is discovered in the future, with certainty the diagnostic feature of four distinct setae on the fore femur will be present.

### *Ragas electrica* sp. nov. (Figs 1, 9, 10)

**Type material.** **Holotype** male in Baltic amber, with following label data: “HOLOTYPE/ *Ragas/ electrica/* Sinclair & Hoffeins”; “CNC DIPTERA/ #12255” (ZFMK). **Paratype:** 1 female, #12256 (ZFMK).

Holotype embedded in 6.5x6.4x4 mm block; milky coating on right side partly obscuring thorax and terminalia. Female paratype embedded in 6x6x4 mm block; in good condition, except air bubble on right side partially obscuring posterior region of head, thorax and anterior segments of abdomen.

**Recognition.** This species is distinguished by dichoptic male, stylus two-thirds length of postpedicel, auxiliary crossvein between  $R_4$  and  $R_{2+3}$  lacking, wing with well developed and rounded anal lobe, fore femur with three basal setae, male mid femur with two long ventral setae, male terminalia enlarged, broader than abdomen and held upright.



**Figs 1–6.** Habitus and male terminalia photographs of Baltic amber species of *Ragas*. **1.** *R. electrica*, male. **2.** *R. succinea*, female. **3.** *R. eocenica*, male. **4.** *R. eocenica*, male terminalia. **5.** *R. ulrichi*, male, right side. **6.** *R. ulrichi*, male, left side. Scale bar = 1.0 mm, except Fig. 4 where scale bar = 0.25 mm.

**Description.** Wing length 1.9–2.3 mm. **Male. Head:** Dark brown. Dichoptic, bare; upper facets not enlarged. Frons very broadly V-shaped; lacking setulae. Ocellar triangle dorsal, with pair of short ocellar setae and posterior pair lacking; upper postocular setae similar in size to ocellar setae. Postgenal spine-like setae present. Postpedicel with bulbous base, 2x length of base; stylus broad, approximately two-thirds length of postpedicel. Proboscis view obscured. Antennal postpedicel bulbous and tapering apically, stylus 2-segmented with short apical sensillum (Fig. 9); stylus nearly two-thirds length of postpedicel, 2<sup>nd</sup> segment more than twice length of 1<sup>st</sup> segment. **Thorax:** Dark brown. Mesonotal setae mostly short and inconspicuous; acrostichals ? uniserial; 7–8 uniserial dorsocentral setae, prescutellar seta long and stout; one short postpronotal seta; several short presutural supra-alar setae; one long and stout upper notopleural seta; one postalar seta; two pairs scutellar setae, apical pair longest. **Wing:** Pigmentation and cloudiness not visible; anal lobe well developed, broadly rounded. Radial fork V-shaped, branching near mid-length of  $M_1$ ; auxiliary crossvein between  $R_4$  and  $R_{2+3}$  lacking; cell dm broad, extended apically less than half length of cell. Apex of cell cua slightly rounded; anal vein (CuP + CuA) obscured. Pterostigma not visible. Halter light brown. **Legs:** Light brown. Anterior face of fore coxa with at least six long, erect spine-like setae. Anteroventral and ventral face of fore trochanter with some eight long, erect spine-like setae, several longer than setae on base of fore femur. Fore femur with three stout, anteroventral setae near base (assumed one seta lost on left femur), after which femur slightly attenuated, setae nearly subequal to width of femur. Mid femur with two stout posteroventral setae beyond midlength, 1.5–2.0x longer than width of femur. Mid tibia lacking modified setae opposite seta on femur. **Terminalia** (Fig. 10): Held upright, broader than width of abdomen, unrotated. Hypandrium subequal in length to epandrium. Phallus long and membranous, projecting beyond terminalia along ventral margin of hypandrium. Epandrium U-shaped, lamella broad laterally with broad apex. Cercus view obscured.

**Female.** Similar to male, except lacking stout setae on mid femur. Terminalia: cercus short, slender, shorter than preceding segment.

**Etymology.** The specific name is from the Greek ἤλεκτρον *ēlektron* (amber).

**Remarks.** The relationship of this species to other species of *Ragas* is unknown. The details of the male terminalia are not sufficient to make comparisons.

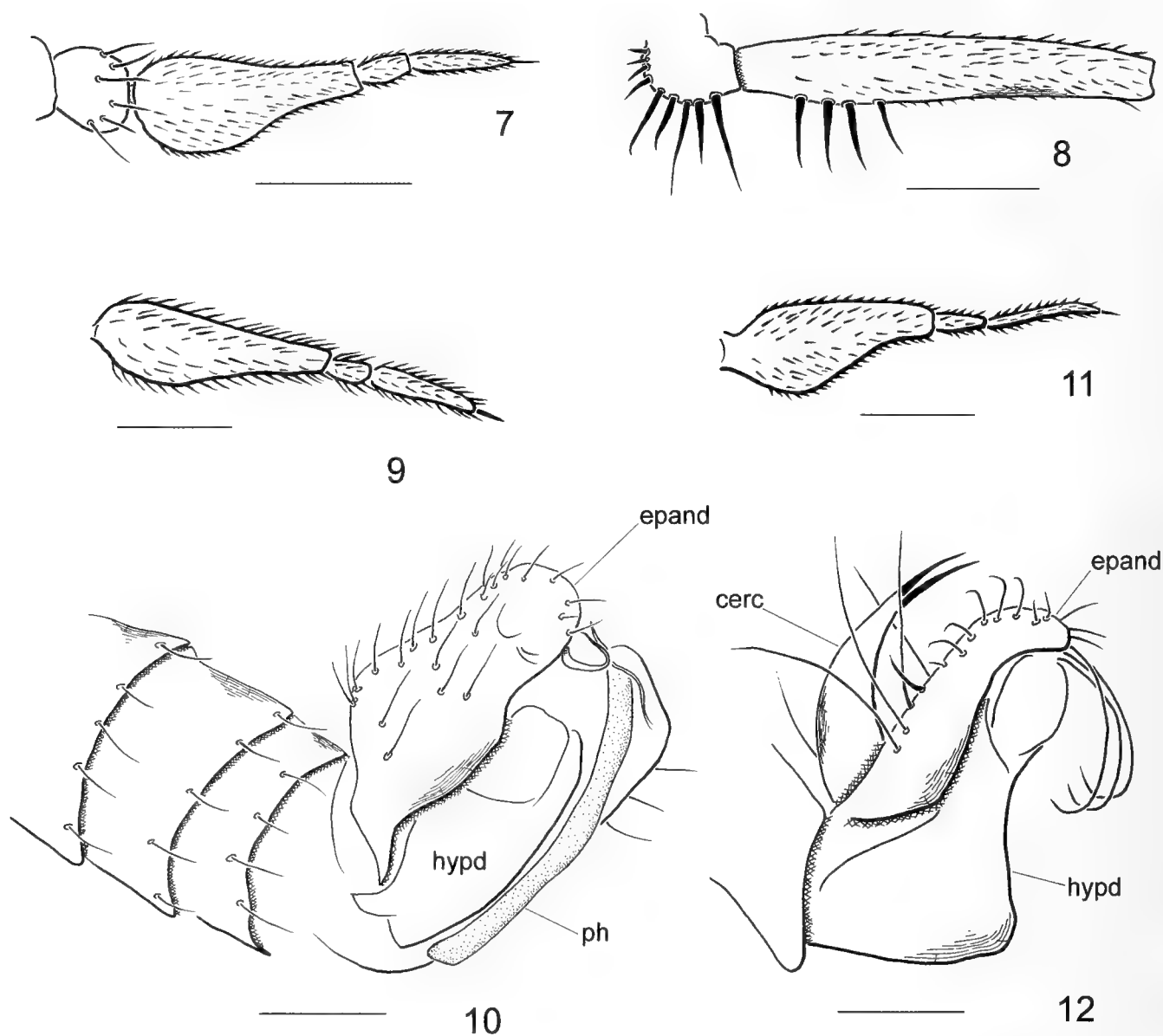
*Ragas eocenica* sp. nov. (Figs 3, 4, 11, 12)

**Type material.** **Holotype** male in Baltic amber, with following label data: “HOLOTYPE/ *Ragas/ eocenica/ Sinclair & Hoffeins*”; “CCHH 1622–1” (SDEI).

Amber with inclusion embedded in a rectangular polyester block 14x9x5 mm. The amber piece was treated in autoclave under high pressure and heating, thus body and legs of the inclusion are shrunken and somewhat compressed laterally, cuticle partly destroyed, setae of head and thorax are visible just from lateral view, main diagnostic features not modified by autoclave treatment (Hoffeins 2012). Syninclusion: stellate hairs.

**Recognition.** This species is distinguished by dichoptic males, elongate and narrow wing, long and V-shaped radial fork, stylus nearly subequal in length to postpedicel, and spine-like setae on the fore coxa lacking.

**Description. Male.** Body length 1.7 mm, wing length 2.2 mm, width 1.6 mm. **Head:** Dark brown. Dichoptic, bare, anterior facets slightly enlarged; frons at vertex broader than above antenna, with lateral eye emargination above antenna. Frons at inner margin of eye with 3–4 setulae; ocellar triangle dorsal, with pair of short posterior and longer anterior ocellar setae; two long vertical setae; occiput with scattered long setae. Postgena with cluster of black, spine-like setae. Proboscis and labrum arched, about as long as height of head. Antennal postpedicel bulbous and tapering apically, stylus 2-segmented with short apical sensillum (Fig. 11); stylus nearly subequal in length to postpedicel, 2<sup>nd</sup> segment 2.5x longer than 1<sup>st</sup> segment. **Thorax:** Dark brown. Mesonotal setae short and inconspicuous, approximately 7–8 dorsocentrals, scutellum with one pair of apical setae. **Wing:** Auxiliary crossvein between  $R_4$  and  $R_{2+3}$  absent; radial fork long and V-shaped (Fig. 3). Anal lobe narrow; anal vein (CuP + CuA) long, ending at end of wing margin. Pterostigma overlapping  $R_1$ . Halter brown. **Legs:** Brown. Anterior face of fore coxa without spine-like setae; trochanter with six spine-like setae, varying in length; fore femur with two (antero)ventral setae near base, of equal length, nearly as long as width of femur, mid femur with one stout, black posterior spine-like seta near apex, 2–3x longer than width of femur (legs shrunken, thus exact comparison not reliable). Fore and hind tibiae with rows of anterior and posterior short setae, bent downwards and with interadjacent erect microsetulae, setae on mid tibia inconspicuous. Apical tibial comb present on fore and hind tibiae. **Terminalia** (Figs 4, 12): Held upright, unrotated. Hypandrium longer than epandrium. Epandrium slender with arched apex; at least three anterior pairs of long setae, posterior part with several shorter, stronger and apically arched setae. Cercus with strongly sclerotized bifid tip. Phallic comprising slender filaments with coiled apex. **Female.** Unknown.



**Figs 7–12.** 7. *Ragas baltica*, antenna, female. 8. *R. baltica*, female foreleg. 9. *R. electrica*, antenna, female. 10. *R. electrica*, male terminalia. 11. *R. eocenica*, antenna, male. 12. *R. eocenica*, male terminalia. Abbreviations: cerc – cercus; epand – epandrium; hypd – hypandrium; ph – phallus. Scale bars = 0.1 mm.

**Etymology.** The specific name is in reference to the Eocene age of the amber species.

**Remarks.** *Ragas eocenica* appears to possess slender phallic filaments, also observed in the extant species, *R. circinata* Sinclair & Saigusa.

***Ragas succinea* sp. nov.** (Figs 2, 13–15)

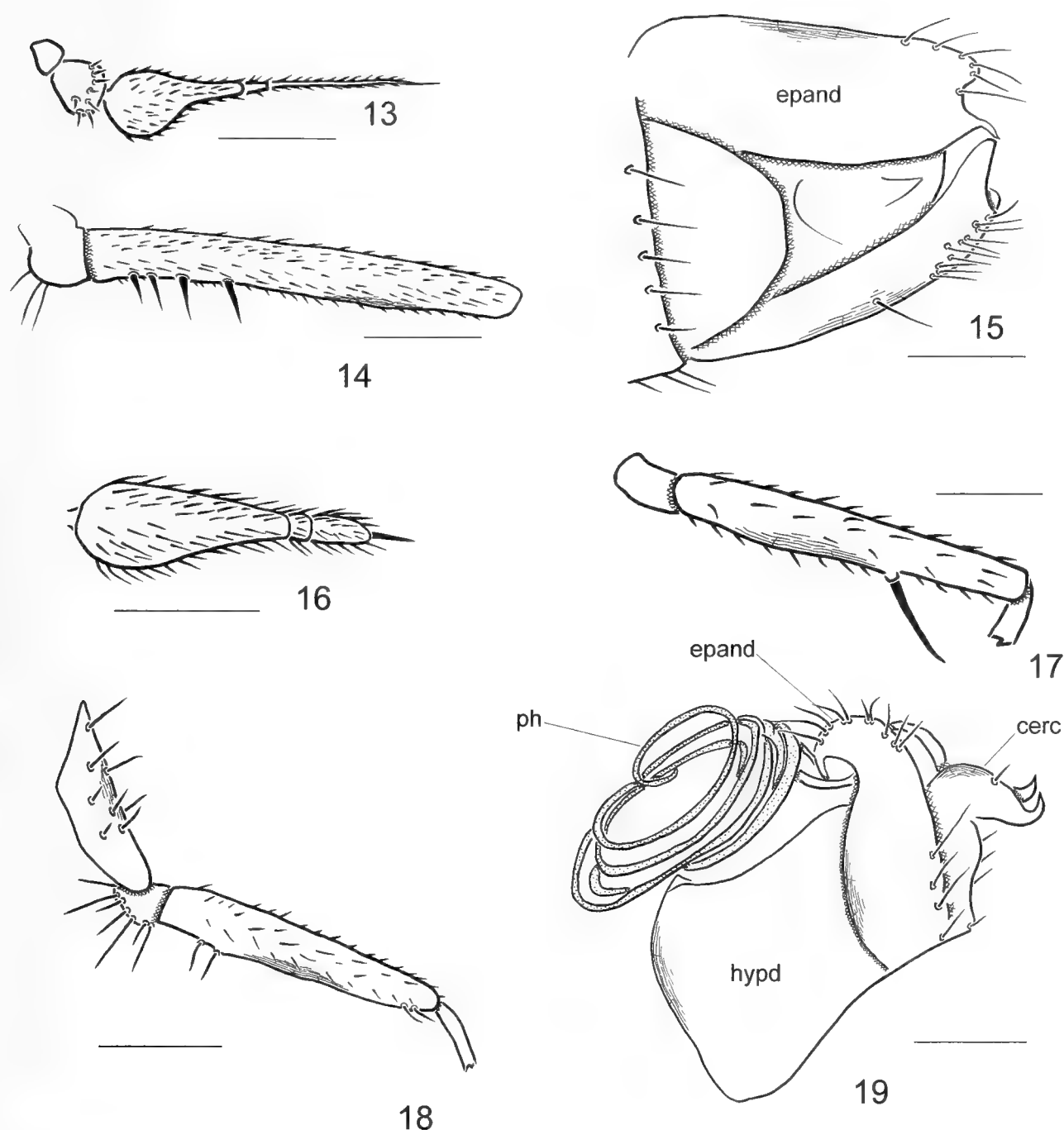
**Type material.** Holotype male and paratype female in Baltic amber, with following label data: “HOLOTYPE/ *Ragas/ succinea*/ Sinclair & Hoffeins”; “CCHH 1458–1” (SDEI).

Amber with inclusions embedded in a rectangular polyester block 17x10x4 mm; abdomen in a decayed condition, distal segments of abdomen densely covered by fungi hyphen; lateral and dorsal views obscured by multi-

sized air bubbles. Syninclusions: female, right side slightly obscured by milky veil; stellate hairs.

**Recognition.** This species is distinguished by  $R_{4+5}$  unbranched, four spine-like ventral setae near the base of the fore femur and spine-like setae of the postgena lacking.

**Description. Male.** Body length 3.4 mm, wing length 3.7 mm, broadest width 1.15–1.2 mm. **Head:** Dark brown. Holoptic, bare; upper facets enlarged. Frons lacking setulae. Ocellar triangle dorsal, with short ocellars and two pairs of upper postocular setae, outer pair slightly longer. Postgena with dense silky long setae, spine-like setae lacking. Proboscis and labrum slightly longer than face. Antennal postpedicel with bulbous base, tapered apically, tytus nearly 3x longer than postpedicel. **Thorax:** Brown. Mesonotal setae inconspicuous acrostichals and dorsocentrals present. **Wing:** Anal lobe well developed, prominent



**Figs 13–19.** 13. *Ragas succinea*, antenna, female. 14. *R. succinea*, right foreleg, female. 15. *R. succinea*, male terminalia. 16. *R. ulrichi*, antenna, male. 17. *R. ulrichi*, male midleg. 18. *R. ulrichi*, male foreleg. 19. *R. ulrichi*, male terminalia. Abbreviations: cerc – cercus; epand – epandrium; hypd – hypandrium; ph – phallus. Scale bars = 0.1 mm.

and acute. Radial fork absent (Fig. 2); anal vein (CuP + CuA) long, ending just before wing margin. Pterostigma present. Halter pale. **Legs:** Brown. Tibiae and tarsi of fore and left mid legs broken off, visible only from ventral side; front of left fore coxa at base with two black, stout, short spine-like setae; fore trochanter with 10–12 black, erect stout spine-like setae, size variable, longest one subequal to width of trochanter; fore femur with four ventral, black, spine-like setae, shorter than width of femur. Hind tibia distally with short setae and interadjacent, erect micro-setulae. Apical tibial comb present. **Terminalia** (Fig. 15):

Visible only from ventral side, terminal, not upright. Hypandrium shorter than epandrium. Epandrium with posteroventral hook-like projection.

**Female.** Body length 3.4 mm, wing length slightly longer than 3.4 mm, width 1.2 mm; wings not in exact plain position caused by resin flow. **Head:** Dark brown. Dichoptic, eyes bare, upper facets not enlarged, anterior ocellars short, posterior postocular setae longer, some scattered upper postocular setae longer; frons with four short setae at inner margin of eye. Postgena densely covered with cluster of silky setae. Proboscis with labrum bent

backwards, slightly longer than width of eye. Antennal postpedicel with bulbous base, tapered apically (Fig. 13), stylus 2-segmented, 1<sup>st</sup> segment short, 2<sup>nd</sup> segment 3x longer than postpedicel. **Thorax:** As in male, chaetotaxy of mesoscutum only visible laterally, dc present. **Wing:** As in male. **Legs:** Brown. Fore coxa with two black, erect, anterior spine-like setae at base as in male, slightly shorter than width of coxa; trochanter with cluster of black, erect spine-like setae, lower one 3x longer than uppermost; fore femur with four ventral black (Fig. 14), erect spine-like setae near base, shorter than width of femur. Fore tibia opposite femur with row of about 20 short, stout erect setae, length of setae decreasing to apex of tibia, row of stout setae continuing to base of tarsomere 1, short stout setae clustered at apex of tibia and base of tarsomere 1 near articulation. Hind tibia distally with short setae, bent downwards, and with interadjacent erect micro-setulae. Apical comb present on hind tibia. **Terminalia:** No clear details discernible, cerci withdrawn between tergite and sternite of terminal segment.

**Etymology.** The specific name is from the Latin *succinum* (amber).

**Remarks.** The male and female are embedded very close together, and no differences in chaetotaxy of the legs can be recognized although forelegs of the male are not complete. The male and female specimens are confidently considered conspecific.

***Ragas ulrichi* sp. nov.** (Figs 5, 6, 16–19)

**Type material.** **Holotype** male in Baltic amber, with following label data: “HOLOTYPE/ *Ragas/ ulrichi*/ Sinclair & Hoffeins”; “CNC DIPTERA/ #12249” (ZFMK). **Paratypes:** 2 males, 3 females, #12250–12254 (ZFMK); 1 female, #CCHH 1458–5 (SDEI), 1 male, #CCHH 1458–6 (SDEI). **Additional material.** 1 male, #CCHH 1458–4 (SDEI); 1 male, #CCHH 1458–7 (SDEI); 1 female, #CCHH 1458–3 (SDEI); 1 male, #CCHH 1458–8 (SDEI).

Holotype embedded in 6x6x4 mm block; in good condition, milky coating partially obscuring thorax and back of head on right side. Male paratype (1458–6) embedded in polyester block 9x9x5 mm; partly in poor condition, milky coating obscuring partly thorax and occiput, air bubbles between mid and hind legs, inner part of mid femora hidden. Female paratype (1458–5) embedded in polyester block 13x11x6 mm; in poor condition, right side obscured by milky coating, basal segments of abdomen bloated, wings overlapping over abdomen; not all characters discernable.

**Recognition.** This species is distinguished by holoptic males, stylus one-third length of postpedicel, auxiliary crossvein between  $R_4$  and  $R_{2+3}$  lacking, wing with broad anal lobe, fore femur with two basal setae, male mid femur with one long ventral seta, and long coiled and slender phallus.

**Description.** Wing length 1.9–2.3 mm. **Male: Head:** Dark brown. Holoptic, bare; upper facets enlarged. Frons lacking setulae. Ocellar triangle dorsal, with pair of short anterior ocellar setae and shorter posterior pair; two pairs of upper postocular setae similar in size to anterior ocellar setae. Postgena with broad cluster of some 10–15 spine-like setae. Postpedicel with bulbous base, 3x length of base; stylus broad, approximately one-third length of postpedicel. Proboscis with labrum slightly longer than postpedicel. Antennal postpedicel bulbous and tapering apically, stylus 2-segmented with short apical sensillum (Fig. 16); stylus nearly one-half length of postpedicel, 2<sup>nd</sup> segment twice length of 1<sup>st</sup> segment. **Thorax:** Dark brown. Mesonotal setae mostly short and inconspicuous; acrostichals ? uniserial; some 4–8 uniserial dorsocentral setae, prescutellar seta longer and stouter; one short postpronotal seta; three short presutural supra-alar setae; one long and stout upper and two shorter lower, more slender notopleural setae; one postalar seta; two pairs scutellar setae, apical pair longest. **Wing:** Pigmentation and cloudiness not visible; anal lobe well developed, prominent and acute. Radial fork bell-shaped, branching near proximal third of  $M_1$ ; auxiliary crossvein between  $R_4$  and  $R_{2+3}$  lacking; cell dm broad, extended apically less than half length of cell. Apex of cell cua truncate; anal vein (CuP + CuA) long, ending short of wing margin. Pterostigma overlapping apex of  $R_1$ . Halter brown. **Legs:** Brown. Anterior face of fore coxa with approximately 6–8 long, erect spine-like setae. Anteroventral and ventral face of fore trochanter with some 6–9 long, erect spine-like setae, several longer than setae on base of fore femur. Fore femur with two stout, anteroventral setae near base (Fig. 17), distal seta longer and stouter, after which femur slightly attenuated, setae nearly subequal to width of femur. Mid femur with stout, arched posteroventral seta at apical third, 2x longer than width of femur (Fig. 18). Mid tibia lacking modified setae opposite seta on femur. **Terminalia** (Fig. 19): Erect not projecting dorsally over abdomen, unrotated. Hypandrium U-shaped in posterior view, with thinly sclerotized ventral face. Phallus (or phallic filaments) long and coiled into at least three circles, usually lying on right-hand side. Epandrium U-shaped, apical portion of lamella slender, apex attenuated. Cercus short and broad, apparently less than half length of epandrium.

**Female.** Similar to male, except eyes widely separated on frons; 3–4 setulae along inner eye margin above antenna. Lacking stout seta on mid femur. Terminalia: cercus short, slender, longer than preceding segment.

**Etymology.** This species is dedicated to Dr. Hans Ulrich who kindly made available his rich collection of amber Empidoidea.

**Remarks.** This amber species is possibly related to the four extant species (*R. alpina* Sinclair & Saigusa, *R. circinata*, *R. longicauda* Sinclair & Saigusa, *R. munroei* Sinclair & Saigusa) on the basis of modified setae on the male mid femur. However, the terminalia are unrotated and held upright, but not over the abdomen, holoptic males and broad wings in the fossil species prevents assignment to this group. The coiled phallus and/or phallic filaments are similar to the coiled phallic filaments of *R. circinata*, but it is difficult to determine whether this condition is homologous.

## DISCUSSION

The phylogenetic relationships of the extant species of *Ragas* were analysed by Sinclair & Saigusa (2001), where they recognized three species groups. *Ragas succinea* is possibly related to the *R. unica* group, although on the basis of plesiomorphic characters (holoptic males, male terminalia horizontal). The three remaining fossil species (*R. electrica*, *R. eocenica* and *R. ulrichi*) are possibly related to the *R. circinata* group on basis of dichoptic males and absence of the auxiliary crossvein. The phallic filaments observed in *R. eocenica* certainly suggest affinities with *R. circinata*. Including *R. baltica*, known only from a female specimen, the *Ragas* fauna in the fossil record is represented by three species groups as recognized for the extant fauna.

Although inclusions assigned to *Ragas* are rarely found among empidoid Diptera in Baltic amber, the study of 19 inclusions with *Ragas* specimens revealed a surprising abundance of species.

## KEY TO FOSSIL SPECIES OF *RAGAS*

1.  $R_{4+5}$  unbranched (Fig. 2). ..... *R. succinea*  
–  $R_{4+5}$  branched. .... 2
2. Fore femur with 4 stout setae near base (Fig. 19) (males unknown). ..... *R. baltica*  
– Fore femur with 2–3 stout setae near base. .... 3
3. Radial fork long and narrow, branching near base of  $M_1$  (Fig. 3). Fore coxae lacking spine-like setae. .... *R. eocenica*  
– Radial fork not unusually long and narrow, branching opposite mid-length of  $M_1$ . Fore coxae with spine-like setae. .... 4
4. Males dichoptic. Fore femur with 3 spine-like ventral setae. Mid femur with 2 spine-like ventral setae. Male with un-coiled phallus (Fig. 10). ..... *R. electrica*

- Males holoptic. Fore femur with 2 spine-like ventral setae (Fig. 8). Mid femur with 1 spine-like ventral setae (Fig. 7). Male with long coiled phallus (Figs 6, 9). ..... *R. ulrichi*

**Acknowledgments.** Hans Ulrich (Bonn, Germany) is thanked for the loan of specimens to BJS from his valuable amber collection of Empidoidea. Shannon Henderson (Ottawa) kindly produced the photographs of *R. electrica* and *R. ulrichi* and Hans Werner Hoffeins is thanked for preparing the Hoffeins' inclusions. Mónica Solórzano Kraemer (Frankfurt) kindly prepared the ZFMK amber specimens.

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## Description of a new genus and three new species of Metarbelidae (Lepidoptera: Cossioidea) from East and Central Africa, with notes on biogeography

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**Abstract.** *Shimonia* gen. nov., a new genus of Metarbelidae (Lepidoptera: Cossioidea), is described from East and Central Africa (Afrotropical Region). It currently comprises four species, three of which are described as new: *S. timberlakei* sp. n., *S. oyiekeae* sp. n. and *S. fischeri* sp. n. The fourth species, *S. splendida* (Fletcher, 1968) is here transferred to the new genus from *Metarbela* Holland, 1893. Illustrations of adult morphology and notes on ecology and biogeography of these species are presented.

**Keywords.** Afrotropical Region, *fischeri* sp. n., forest refuge areas, new species, new genus, *oyiekeae* sp. n., revision, *Shimonia* gen. nov., *splendida*, taxonomy, *timberlakei* sp. n.

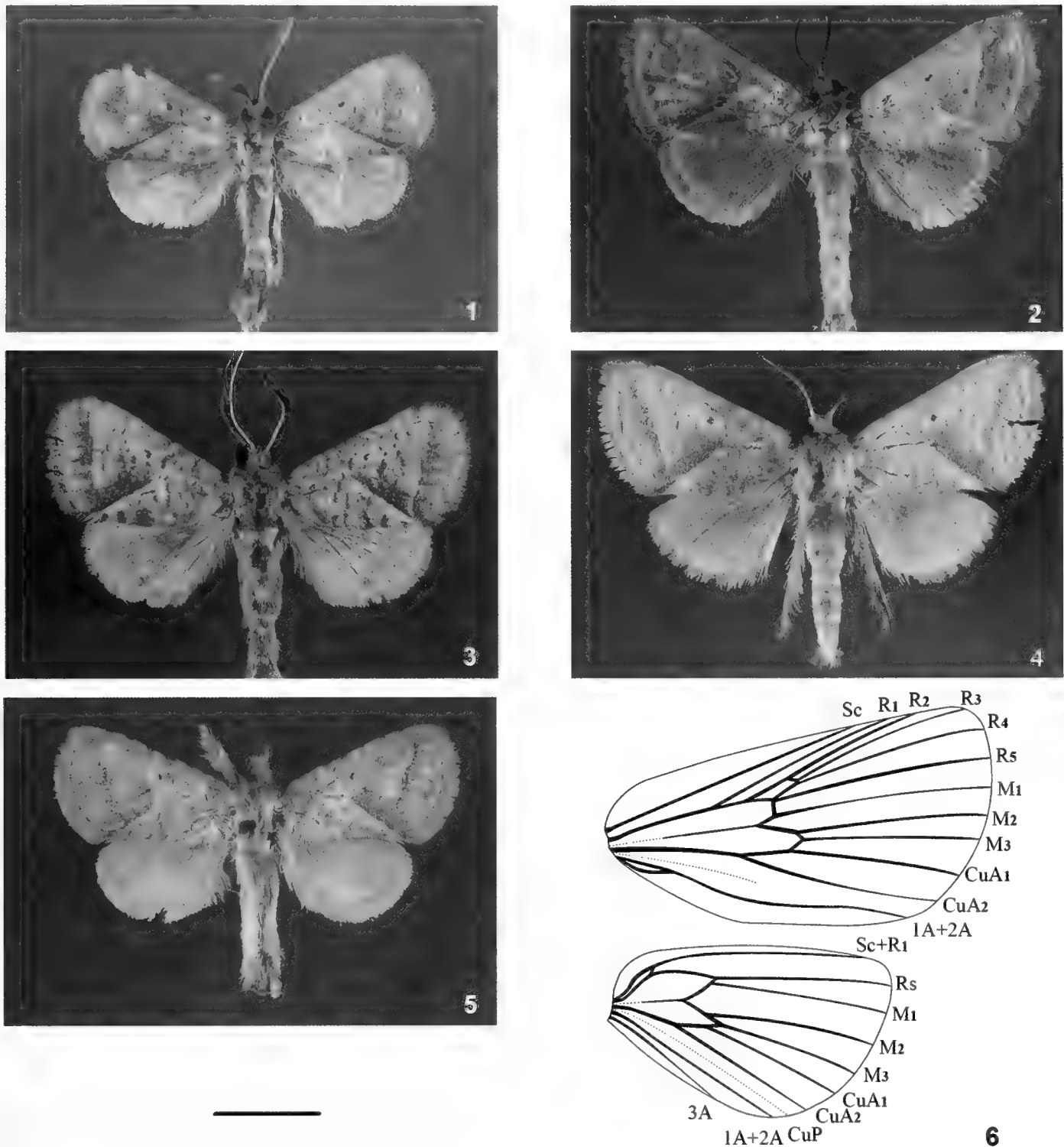
### INTRODUCTION

Since Janse's monograph (1925) for South Africa and Gaede's (1929) publication, there has been no comprehensive treatment of Afrotropical Metarbelidae. Moreover, until the late nineties of the last century, it was not even clarified whether Metarbelidae deserved family rank (Holloway 1986; Schoorl 1990) or should be treated as a subfamily of Cossidae (Minet 1986, Edwards et al. 1998). Though no less than 202 species of Metarbelidae are recorded from the Afrotropics belonging to 16 genera (De Prins & De Prins 2012), this group has not received much attention. Only recently the diversity of the family came into focus again (Lehmann 1997, 2007, 2008a, 2008b, 2010a, 2010b, 2011).

Recent works using molecular methods placed Metarbelidae as one of the seven families of Cossioidea (Regier et al. 2009; Mutanen et al. 2010; van Nieukerken et al. 2011). On the other hand, Cossioidea were found to be a heterogeneous group not forming a monophylum. The position of Metarbelidae within the Cossioidea-Sesioidea assemblage still needs further support, though it appears that Metarbelidae could be closely related to Ratardidae, with which they share several morphological features, e.g., in having only one strong anal vein in the forewing as well as the ovipositor lobes shaped like an '8' (Holloway 1986; Edwards et al. 1998). The family ranges from mainland Africa and Madagascar across Arabia to Southeast Asia (Lehmann 2008b; De Prins & De Prins 2012) whilst some alleged New World 'Metarbelidae' (genus *Indarbela* Fletcher, 1922) belong to the Hypoptinae, a subfamily of the Cossidae (Edwards et al. 1998). Although the gener-

ic and species definitions within Metarbelidae are not yet definitive (Lehmann 2010a, b, 2011), ongoing studies suggest that this family comprises many more than 300 species, and hence about 50% more than previously estimated by Edwards et al. (1998).

Taking into consideration the ongoing deforestation, destruction of natural habitats, rapidly changing anthropogenic environment, and impossibility of field research in some regions of East and Central Africa, presumably a number of yet undescribed species could already be extinct in nature. Therefore the preserved historical collections serve as the major source for defining and revising the genera of Metarbelidae and for assembling taxonomic and faunistic data on this family. Additionally, they offer a chance to present data on habitats. Lepidoptera species are often associated with certain vegetation types or biotopes (Van Dyck 2011). A particular association of Metarbelidae to legume-dominated forests has been emphasized by Lehmann (2008a) based on 14 years of field work in southeast coastal Kenya (Lehmann & Kioko 2000, 2005). However, information on ecology, bionomics and habitats in Central Africa is scant and mostly scattered over many small and obscure publications. Furthermore, this information in regard to habitats is often separated from taxonomic papers and hence, requires integration. The biotopes of Central Africa were formed due to dramatic climate changes over millions of years (Leal 2004). There is a great similarity between upland floras of Central and Northeast Africa and past climate change caused the fragmentation of a once continuous forest belt, includ-



**Figs 1–6.** Adults and venation: **1.** *Shimonia timberlakei* sp. n., holotype ♂, DRC, Eala; **2.** *S. timberlakei* sp. n., paratype ♀, DRC, Eala; **3.** *S. splendida*, ♂, DRC, Isiro; **4.** *S. fischeri* sp. n., holotype ♀, DRC, Katako-Kombe; **5.** *S. oyiekeae* sp. n., holotype ♂, DRC, Lubumbashi; **6.** *Shimonia timberlakei* sp. n., venation. Scale bar for figs 1–5: 10 mm.

ing montane forests, resulting in rain forest refuges (Hooker 1864, 1874; Lönnberg 1929). Subsequently, several authors developed a refuge concept for Africa. It proposes that modern biotas in the tropics originate partly from ecological islands that result from past cycles of forest fragmentation and subsequent expansion. The concept also includes the assumption that from the mid-Cretaceous to

mid-Tertiary there is no evidence of major tectonic disturbances in Africa. Instead, the most important determinants of African biogeography were the northward drift of the continent and the central African uplift in mid-Tertiary, as well as periods of aridity alternating with wetter periods in the Pleistocene and Holocene (e.g., van Zinderen Bakker & Clark 1962; Hamilton 1976; Diamond &

Hamilton 1980; Grubb 1982; Colyn et al. 1991; Maley 1991; Leal 2004). Therefore, referring to the above-mentioned refuge concept, it can be assumed that African forest-dependent species, such as Metarbelidae, survived and partly evolved isolated in these islands because these areas remained permanently forested during cool and dry climatic periods of the Pleistocene.

Here and in the frame work of the revision of the family Metarbelidae (by the first author) we describe a new genus and three new species based on morphological characters.

## MATERIAL AND METHODS

The material examined here comes from the following collections: The Natural History Museum, London, U.K. (BMNH); the National Museums of Kenya, Nairobi (NMK); and the Royal Museum for Central Africa, Tervuren, Belgium (RMCA).

The specimens were photographed and compared with all described Metarbelidae, currently 202 published species.

For the process of maceration the abdomen was detached and macerated between one to three days in a glass tube containing a cold 10% solution of potassium hydroxide. After the maceration of the abdomen the genitalia were removed and transferred to distilled water for cleaning, drawing and spreading. Then the genitalia were flooded with isopropyl alcohol and remained as such for two hours before being mounted in Euparal. The genitalia slides were photographed using a digital stereo-microscope (ZEISS-Stereo: Discovery.V20), in addition specimens of several taxa examined were studied with a Scanning Electron Microscope (SEM, Hitachi S-2460N), both at ZFMK.

The terminology for external characters follows Janse (1925), Scoble (1995), Edwards et al. (1998), and for internal features, mainly the genitalia, Sibatani et al. (1954) and Klots (1970). The biogeographical names follow White (1983), Sayer et al. (1992) and Burgess et al. (2004).

Note: Democratic Republic of the Congo (DRC) has been under this name 1965 to 1971, and again since 1997; it was called the Republic of the Congo 1960 to 1964, and Republic of Zaïre 1971 to 1997.

## TAXONOMIC REVIEW

### *Shimonia* gen. nov.

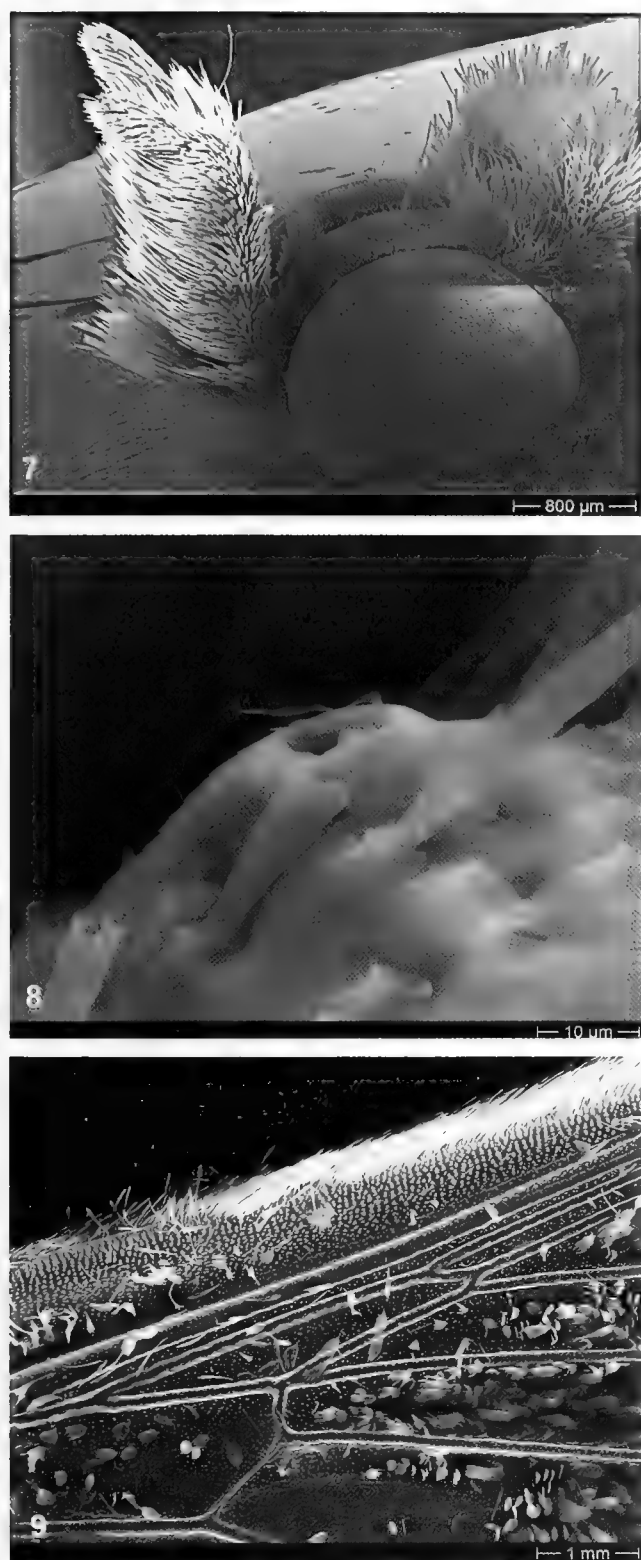
Type species: *Shimonia timberlakei* sp. n.

**Diagnosis.** *Shimonia* possesses typical metarbelid characters (Holloway 1986; Edwards et al. 1998; Lehmann 2008a) which are repeated here with some additions: Head rugulose, not retracted under the prothorax. Antennae

bipectinate in males; bipectinate, unipectinate or filiform in females. Wings long, rather broad (in Cossidae wings longer, narrower, apically more strongly acute, in the also closely related Ratardidae both wings of almost equal size, round, butterfly-like), hindwings smaller than forewings; pattern weak, sometimes absent, often reticulate or transversely striated on a pale ground-colour. Frenulum and retinaculum usually absent; chaetosemata and tympanal organs always absent; epiphysis present or absent, if present it arises from about middle of fore-tibia; tibia and first tarsomere of hindleg not dilated (as in the Cossidae). Only a simple basal stem of vein M present in discal cell of both wings, therefore accessory cells absent (in Cossidae several basal branches of M present, forming accessory cells); vein CuP in forewing obsolete (but represented by a distinct fold which may be incomplete); one strong anal vein in the forewing (fused veins 1A+2A). Male genitalia: uncus beak-like or wide, tip often bifid or bilobed; gnathos arising near base of uncus, sometimes with medially separate or fused, drumstick-, hand- or lever-like appendages; socii very small or absent; valvae small, rather rounded, sometimes with thorn-like processes and/or modification to the sacculus; aedeagus tube-like. Female genitalia: shortly telescopic ovipositor with broad, rounded (8-shaped) or elliptic distal lobes; ductus and corpus bursae small, membranous ('reduced' *sensu* Holloway 1986); membrane between tergites 7 and 8 often expanded.

*Shimonia* is defined as a new genus based on the following putative morphological apomorphies (Figs 10–18): i) in the male genitalia, two narrow and very long thorn-like processes, usually of similar length, extend externally from the base of the valva, reaching beyond its distal edge; ii) segment 8 of female is setose, which is unusual among the other genera of Metarbelidae, with two large latero-ventral plates, ventrally connected by a narrow band. The combination of characters presented above does not occur elsewhere and demands the creation of a new genus.

The very long labial palpi, the long, narrow and well-developed tibial spurs and the rather large areole that sometimes has a short crossbar between  $R_3$  and  $R_4$  are treated here as plesiomorphic characters. These characters have been mentioned for "most primitive genera of Lepidoptera", e.g. *Cossodes* (Cossidae) (Turner 1918). Although other plesiomorphic characters of the latter genus are absent in *Shimonia*, for example simple antennae in both sexes, *Shimonia* is considered as probably one of the most basal or ancient metarbelid genera. Four Afrotropical species of this genus are recognized: *Shimonia timberlakei* sp. nov., *S. splendida* (Fletcher, 1968), *S. fischeri* sp. nov. and *S. oyiekeae* sp. nov. *Shimonia splendida* is transferred from *Metarbela* Holland, 1893 to the new genus, based on the defining characters mentioned above.



**Figs 7–9.** Head and wing structure (SEM) of *Shimonia splendida*, ♀: 7. Head, eyes and palpi (frons largely descaled); 8. Fronto-clypeal projection (lateral view); 9. Section of forewing with areole.

**Description.** Regarding other genera of the Metarbelidae, the moths of the new genus are rather large, with a wingspan of 37–47 mm. *Head*: Rough-scaled; with a pair of small conical projections basally on frons in both sexes (Fig. 8); labial palpi long (the longest among the Metarbelidae, 1.5 times the diameter of eye,) (Fig. 7); anten-

nae of male bipectinate; of female mainly unipectinate (cf. Lehmann 2008a), branches in the middle of the antenna apically bifid; flagellum and dorsal surface of branches densely scaled (this scaling appears to be absent in some females). *Thorax*: Densely covered with hair-like scales, without a collar ring; with a short crest on metathorax. Epiphysis of the foreleg present, hindlegs with two pairs of long and narrow tibial spurs (length at least 1.2 mm) in both sexes. Forewing upperside with simple, reticulate pattern (postmedial line and a straight line along vein  $CuA_2$  always distinct), colours more or less brownish, not strongly contrasting (Figs 1–5). Scales of wing-margins long-stalked (stalks  $3/4$  of total length). Wing venation similar in both sexes (Fig. 6): in forewing  $1A+2A$  forked at base;  $CuP$  obsolete, represented by a fold;  $CuA_2$  originating from posterior margin of cell;  $CuA_1$ ,  $M_3$ , and  $M_2$  basally separated, initiating from or near posterior angle of cell;  $M_1$  arising from about middle of discal vein, slightly closer to  $R_5$  than to  $M_2$ ;  $R_1$  from anterior margin of discal cell;  $R_2$ ,  $R_3$ ,  $R_4$  and  $R_5$  separate, arising from the areole in both sexes or  $R_3+R_4$  originate from the same or nearly the same point, in the latter case there is a very short cross-bar;  $Sc$  more or less parallel to  $R_1$ . In hindwing  $CuA_2$  from posterior margin of discal cell;  $CuA_1$ ,  $M_3$ , and  $M_2$  as in forewing,  $M_1$  close to  $R_5$  from anterior angle of cell, separated or from the same point; a short cross-bar between cell and  $Sc$  (basal stem of  $R_1$ ) usually present; discal cell of both wings with a short vein inside (stem of vein  $M$ ). Retinaculum and frenulum absent. *Abdomen*: covered with dense hair-scales, abdominal tuft not longer than one-third of abdomen length.

**Male genitalia.** Saccus short, narrow, distally rounded; uncus large, flattened, very long and broad, setose on ventral surface; apically bilobed. Valva with two acuminate, very long, thorn-like appendices of similar length, arising externally from its base, bent at their tip; internal surface membranous, densely setose. Gnathos arms very broad basally, covered with many short, tooth-like structures medially; arms not fused, only connected by a narrow band on ventral side. Juxta with two acuminate lobes and a deep emargination dorsally. Phallus simple, vesica without cornuti (Figs 10, 12, 14).

**Female abdominal structure and genitalia.** Segment 8 sclerotized, loosely setose, setae often in groups of two or three; anterior margin of tergal area more or less emarginated. Latero-ventrally on segment 8 two large, rounded or triangular plates present, both connected ventrally by a sclerotized band. Ovipositor short, papillae anales rounded or elliptic, covered with some short, rarely with long setae (Figs 16–18); ductus and corpus bursae small, thinly membranous, without distinct characters (not drawn).

**Distribution.** Species belonging to the new genus are found in Central and East Africa, extending its range from the arc formed by the Congo River in the West (DRC), eastwards into the Albertine Rift region (Uganda) and probably further East to western Kenya (Mount Elgon or close to it). Isiro (northeastern Congo Basin, DRC) is currently the most northern distribution limit, and the Katanagan Copper Bow (southeastern DRC) the most southern limit (Fig. 19).

**Ecology.** *Shimonia* species appear to be forest species that are associated with lowland, submontane or montane rainforests and dense wet woodlands with an average annual rainfall of at least 1200 mm. The species of this genus may be linked to the following vegetation types: "Guineo-Congolian swamp forest and riparian forest"; "Mixed moist semi-evergreen Guineo-Congolian rainforest" including patches of "Single-dominant moist evergreen and semi-evergreen Guineo-Congolian rainforest", "Afromontane rainforest", "Zambezian dry evergreen forest" surrounded by wetter types of "Zambezian miombo woodland" *sensu* White (1983). Different plant communities in the biotopes of *Shimonia* share a common feature: woody legumes are dominants or co-dominants both in the rainforest types as well as in the 'miombo'.

**Etymology.** New genus is named after Shimoni Lehmann, the son of the senior author, who accompanied his father several times on excursions to Africa/Kenya and has always shown great interest in his studies. The gender of the new genus is feminine.

#### KEY TO THE SPECIES OF *SHIMONIA*, BASED ON MALE AND FEMALE GENITALIA

- 1a. Male (male of *fischeri* unknown) ..... 2
- 1b. Female (female of *oyiekeae* unknown) ..... 4
- 2a. Male genitalia with very broad, triangular bases of thorn-like external processes of valva ..... *oyiekeae* **sp. nov.**
- 2b. Male genitalia with narrow bases of thorn-like processes of valva ..... 3
- 3a. Sacculus of valva bearing an additional, short process ..... *splendida*
- 3b. Sacculus of valva without such process ..... *timberlakei* **sp. nov.**
- 4a. Ventral part of segment 8 gradually narrowed to a slender connection, anterior apophyses about twice as long as posterior apophyses ..... *fischeri* **sp. nov.**
- 4b. Ventral part of segment 8 forming a broad sclerotized band; anterior apophyses as long as posterior apophyses or slightly longer ..... 5
- 5a. Latero-ventral sclerotized plate on segment 8 oval ..... *timberlakei* **sp. nov.**

- 5b. Latero-ventral sclerotized plate on segment 8 elongate triangular ..... *splendida*

#### 1. *Shimonia timberlakei* **sp. n.**

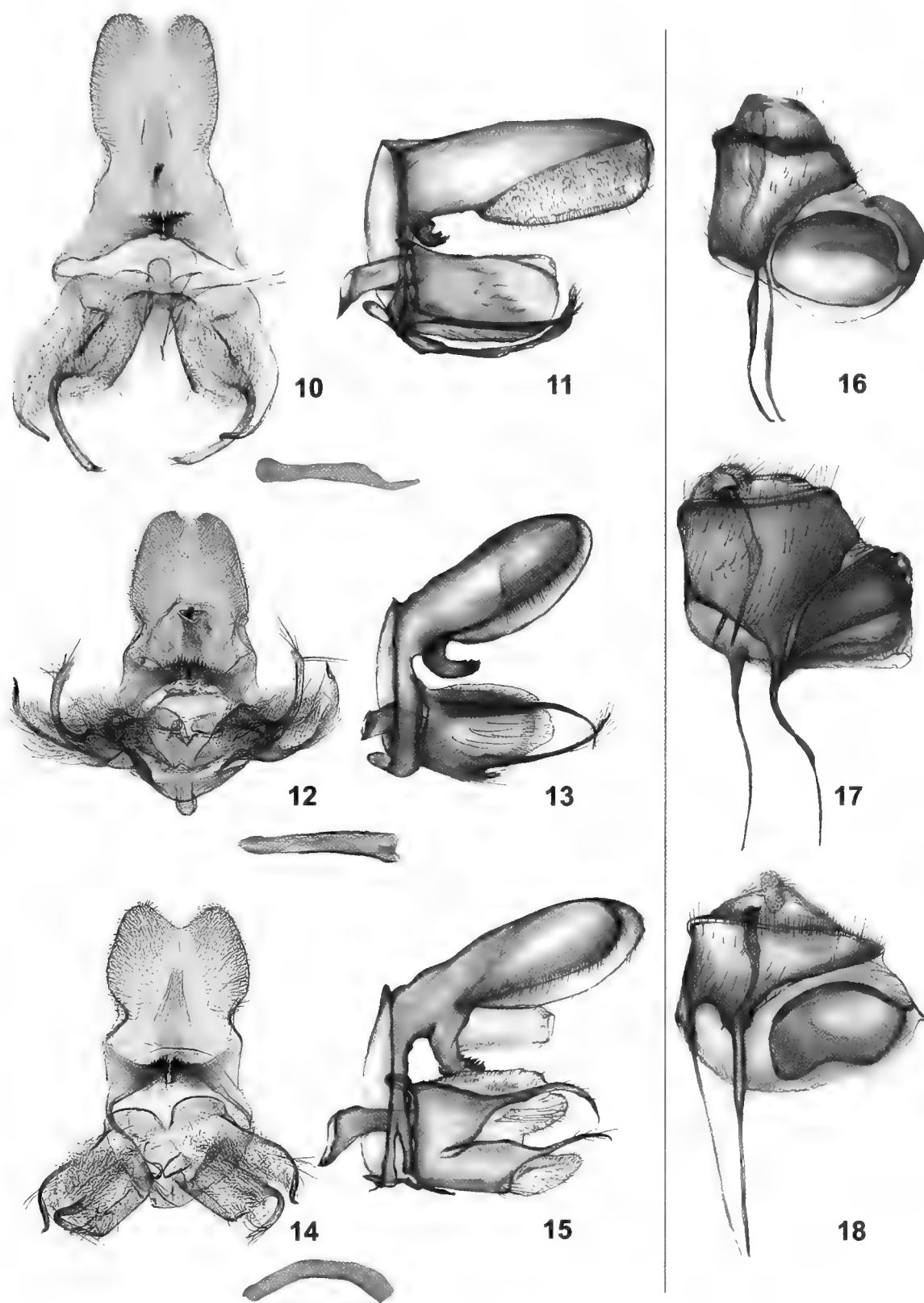
Figs 1, 2, 10, 11, 16

**Material examined.** *Holotype* ♂, Belgian Congo, Équateur Province, Eala, 19 June 1935, J. Ghesquière leg., [label] number 616, genitalia slide number 31/072010 I. Lehmann (RMCA). *Paratype* ♀, same locality and date, J. Ghesquière leg., number 616, genitalia slide number 12/072010 I. Lehmann (RMCA).

**Description.** Forewing length in male 16.0 mm (wingspan 38 mm), in female 19.0 mm (wingspan 41 mm); antenna-wing ratio 0.69:1 in male, 0.58:1 in female. *Head:* light-ochre, scales glossy, eyes olive with small black spots; antennae coloured as head; branches of antennae 7 times width of shaft in males, 1.5 times in females, covered with minute scales dorsally; tip of antennae with long, strongly bent scales; labial palpi light-ochre, tips pointed. *Thorax:* Patagia and tegulae light-ochre, glossy. Hind-femora, -tibiae and -tarsi light-ochre, glossy, with two pairs of tibial spurs, medial pair shorter. Forewing light-ochre, glossy; with a small, rounded, sepia cell-spot and a small patch of olive-ochre distally; several faded lines of olive running from costa to CuA<sub>2</sub>; subterminal line broad, olive with a patch of olive-ochre in its distal half; CuA<sub>2</sub> marked olive anteriorly, light ochre posteriorly; ciliae of wing margins long, 1.5 mm, light-ochre. Underside of forewing rough-scaled, of a lighter ochre than above, glossy. Hindwing upperside with ground-colour as in forewings, but almost patternless, glossy; underside as in forewing. Wing venation see Fig. 6. *Abdomen:* Mainly light-ochre, glossy.

**Male genitalia** (Figs 10, 11). Uncus large (2.5 times the length of the tegumen), ventrally setose, roundly bilobed distally, rather rectangular in lateral view; gnathos short, very broad basally, distally bent and strongly dentate; arms not completely fused at middle, only connected by a narrow band caudally; valva almost rectangular, but distally smoothly rounded, setose at internal surface, ventral margin with long setae, with two very long thorn-like processes externally, the latter with acuminate and setose tips, their median sector with a few scattered short and long setae; tegumen basally fused with vinculum, the latter forming a firm and very narrow ring. Saccus short, finger-shaped, gently rounded caudally. Phallus short, about as long as valva, straight, narrowest in middle, bilobed with a deep cleft distally.

**Female abdomen and genitalia** (Fig. 16). Papillae anales broad, shaped like an '8' in posterior view, almost without setae. Segment 8 long, covered with long scattered se-



**Figs 10–18.** Male and female genitalia. 10, 11. *Shimonia timberlakei* sp. n., holotype ♂; 12, 13. *S. splendida*, ♂; 14, 15. *S. oyiekeae* sp. n., holotype ♂; 16. *Shimonia timberlakei* sp. n., paratype, ♀; 17. *S. splendida*, ♀; 18. *S. fischeri* sp. n., holotype, ♀. 10, 12, 14. ventral view; 11, 13, 15. lateral view (males); 16, 17, 18. lateral view (females; ductus and corpus bursae omitted). Scale bar: 1mm.

tae often arranged in groups of three; anterior margin dorsally only with a shallow emargination; latero-ventrally with two large, rounded, sclerotized plates, connected by a band ventrally. Posterior apophyses slightly sinuate, almost as long as anterior ones.

**Diagnosis.** The very large, setose, sclerotized uncus (2.5 times length of tegumen) is unique in the genus. The female genitalia share the oval latero-ventral plates with those of *S. fischeri* sp. n., but these plates are rather kidney-shaped in *fischeri*, the ventral band connecting both

plates is much narrower in the latter, the deep, semi-circular emargination of the anterior margin of the tergal plate present in *S. fischeri* is only shallowly emarginated in *S. timberlakei*. The apophyses are almost equal in length, while in *fischeri* the anterior apophyses are almost twice as long as the posterior apophyses (compare fig. 18).

**Distribution.** *S. timberlakei* sp. n. is currently known only from Eala, DRC. Eala (altitude 328 m) has no dry season and its average annual rainfall is about 2070 mm.

**Etymology.** The species is named after the editor of *Flora Zambesiaca*, Jonathan Timberlake (Royal Botanic Gardens Kew, U.K.) to honor his attention to conservation issues of *Acacia* and *Brachystegia* and for his kind provision of important unpublished information on various habitats in Zambia, Zimbabwe and Mozambique to the first author.

## 2. *Shimonia splendida* (Fletcher, 1968), **comb. nov.**

Figs 3, 7–9, 12, 13, 17

*Metarbela splendida* Fletcher, 1968: 329

**Material examined.** Holotype ♂, Uganda, Bundibugyo District, Rwenzori Range, Bwamba Pass, 6.500 feet, December 1934–January 1935, F.W. Edwards leg. (BMNH). *Additional specimens:* 1 ♂, Belgian Congo [Democratic Republic of the Congo], Uele District, Paulis [Isiro], 15 February 1959, Dr. M. Fontaine leg., genitalia slide number 04/072010 I. Lehmann (RMCA); 1 ♀, Belgian Congo [Democratic Republic of the Congo], Uele District, same locality, 09 February 1960, Dr. M. Fontaine leg., genitalia slide number 05/122010 I. Lehmann (RMCA).

### Original description of *Metarbela splendida* Fletcher, 1968 (p. 329):

“Male 47mm: Vestiture pale ochre, weakly suffused with drab. Fore wing ochre, patterned with broken, transverse striae of grey ochre, surrounded by cinnamon brown irroration; pattern dense anterior of vein *Culb* and at three-fifths inner margin; vein *Culb* edged posteriorly with parallel area of clean and sharply defined ground colour. Hindwing pale ochre, very lightly irrorate with drab. Distinct in the genus by reason of its pattern and its very large size, being one and one-half times greater in wingspan than any known species”.

**Additional re-description.** Forewing length in male and female 20.0 mm (wingspan 45 mm); antenna-wing ratio in male 0.70:1 (antenna broken in female specimen). *Head:* Greyish-ochre, with cream-coloured scales around eyes and base of antennae; eyes brown; antennae very long, with pure white scales dorsally on shaft; length of antennal branches 7 times width of shaft, densely covered

with pale olive scales dorsally, tips with long scales, strongly bent backwards (towards proximal part of antenna), all branches ventrally setose (setae arranged in pairs up to base of branch); female antennae unipectinate; flagellum with ochreous scales; branches 1.5 times width of shaft, flat. Labial palpi longer than diameter of eye (Fig. 7), olive ventrally and laterally, sepia dorsally; tips narrow. *Thorax:* Patagia and tegulae greyish-ochre, scales with grey tips; a crest of cream mixed with greyish-ochre on metathorax. Hindleg-femora, -tibiae and -tarsi cream-coloured, glossy; two pairs of tibial spurs present, medial spurs at middle of tibia, about 1.6 mm long, apical spurs about 1.5 mm long, reaching over the first tarsomere; distance between medial and apical spurs about 2.5 mm. Forewing upperside pale greyish-ochre; a narrow terminal and broad subterminal line of dark olive stretching from apex to near tornus; a small rounded discal spot of sepia present in cell; several faded lines of olive running from costa to dorsum; a broad, dark olive band anterior along  $CuA_2$ , a pale line posterior to it; ciliae of wing margin long, ca. 1.5 mm; underside cream, glossy. Hindwing upperside pale greyish-ochre, with a faded reticulated pattern of strong olive, glossy; underside and cilia shaded as in forewing. Wing venation very similar to that of *S. timberlakei*. *Abdomen* coloured like upperside of wings.

**Male genitalia** (Figs 12, 13). Uncus smaller than in the previous species (around 1.5 times the length of the tegumen), ventrally setose, with short and long setae, roundly bilobed distally. Gnathos bent hook-like in lateral view, distally dentate; arms medially not fused, only connected by a narrow band caudally. Valva bearing two widely separated, very long thorn-like processes with acuminate tips, the ventral process covered with long setae distally; valva setose at internal surface; outer surface ventrally and medially covered with long sparse setae; sacculus with a weakly sclerotized setose extension. Tegumen basally fused with vinculum, the latter forming a firm ring; sacculus short, rounded caudally. Phallus slightly longer than valva, slightly sinuate, narrowing towards apex, the latter bilobed, with a deep cleft.

**Female abdomen and genitalia** (Fig. 17). Papillae anales shaped like an ‘8’; segment 8 covered with long, rather scattered setae, often arranged in groups of three; tergal region broad, with a gently rounded emargination anteriorly, narrower ventrally; latero-ventral sclerotised plates narrowly triangular, ventrally connected by a broad band. Posterior apophyses broader at base, slightly angled medially, a little shorter than anterior apophyses which are gently sinuate and slightly longer than length of segment 8.

**Diagnosis.** The male of *S. splendida* is structurally unique in the genus because of its pronounced saccular process.



Fig. 19. Type localities of species of *Shimonia* gen. nov. (indicated by black spots and bold fonts).

The female of *S. splendida* can be easily distinguished from its congeners by the triangular shape of the latero-ventral sclerotized plates on segment 8 which in *S. timberlakei* sp. n. and in *S. fischeri* sp. n. are roundish or oval. Papillae anales are densely covered with long and short setae (long setae are absent in the other two species).

**Distribution.** *Shimonia splendida* is currently known from the northeastern region of DRC (Isiro) and western Uganda (Rwenzori Mountains). Isiro (formerly called Paulis; 02°46'N, 27°36'E; altitude 750 m; average annual rainfall 1530–1600 mm) is a town about 50 km north of the large Ituri Forest in northeastern DRC (Haut-Uele Province). Bwamba Pass (average annual rainfall 2200–3000 mm; collecting site at the altitude of 1981 m) is located in the Rwenzori Mountains. It is the old trail between Fort Portal and Bundibugyo (T. Davenport, pers. comm.).

### 3. *Shimonia fischeri* sp. n.

Figs 4, 18

**Material examined.** Holotype ♀, Belgian Congo [Democratic Republic of the Congo], Sankuru, Katako-Kombe, 23 June 1952, Dr. M. Fontaine leg., genitalia slide number 26/092010 I. Lehmann (RMCA).

**Description.** Female forewing length 21.0 mm (wingspan 45 mm); antenna-wing ratio 0.52:1. *Head*: Ochre around eyes and base of antennae; eyes brown with small black patches; antennae densely scaled olive on dorsal side of the shaft as well as on branches; length of branches of antennae 1.5 times width of shaft; tips with long scales, only slightly bent backwards, covered with scattered hairs ventrally; labial palpi longer than diameter of eye, light-ochre ventrally and laterally, slightly darker dorsally. *Thorax*: Patagia and tegulae light ochre, glossy. Hindleg-femo-

ra, -tibiae and -tarsi ochre; medial spurs at half of tibia 2.0 mm long, apical spurs ca. 1.5 mm long, covering first tarsomere; distance between medial and apical spurs about 2.5 mm. Forewing upperside light ochre, with many short striae; terminal line reduced to striae; a broad subterminal line of dark olive stretching from apex to CuA<sub>2</sub>; a small rounded discal spot of dark ochre present in cell; several faded lines of olive running from costa to dorsum, two broader lines below CuA<sub>2</sub>, the latter marked dark olive but cream on posterior edge; ciliae of wing margins long, ca. 1.5 mm, ochre; underside ochre, glossy. Hindwing upperside light ochre, glossy; underside and cilia as in forewing. *Abdomen* largely ochre.

**Male.** Unknown.

**Female abdomen and genitalia** (Fig. 18) Sclerotized plates of segment 8 covered with many setae, arranged in a row on posterior margin and in pairs on its surface, broad dorsally, with a deep semicircular emargination anteriorly, gradually narrowed to small ventral connection, latero-ventral plates bean-shaped, with shallow rounded emargination on its anterior margin and ventrally connected by a narrow band. Anterior apophyses broad in basal third, ca. 2 times as long as posterior apophyses which are gently sinuate, about as long as segment 8.

**Diagnosis.** *Shimonia fischeri* sp. n. superficially resembles *S. splendida*. However, the ground colour of *S. fischeri* is a lighter ochre; moreover, *S. fischeri* has a very short cross-bar from R<sub>3</sub> to R<sub>4</sub> and vein R<sub>5</sub> is originating from the middle of the posterior vein of the areole in the forewing, a unique feature in the genus. The long setae on segment 8 are often arranged in groups of two (groups of three in *splendida*). Only few setae occur on the papillae anales (more densely setose in *splendida*). The sclerotized tergal plate of segment 8 is distinctly broader than the narrow sternal plate, and the latero-ventral plates are ovate (triangular in *splendida*) and ventrally connected by a band. *S. oyiekeae* is also similar in the ground colour (differences see next species).

**Distribution.** *Shimonia fischeri* sp. n. is known from the southeastern region of the Congo Basin (Katako-Kombe, province Kasai-Oriental, southeast DRC). Katako-Kombe is located at an altitude of 570 m, average annual rainfall 1700–1900 mm.

**Etymology.** The species is named after the botanist Professor Dr. Eberhard Fischer (University of Koblenz-Landau, Germany) to honour his attention to conservation issues of the plants of Nyungwe National Park (Rwanda) and of the orchids of Rwanda.

#### 4. *Shimonia oyiekeae* sp. n.

Figs 5, 14, 15

**Material examined.** *Holotype* ♂, Belgian Congo [Democratic Republic of the Congo], Katanga, Elisabethville [Lubumbashi], 19 Sept 1952, Ch. Seydel leg., genitalia slide number 03/072010 I. Lehmann (RMCA). *Paratype* ♂, Republic of the Congo [Democratic Republic of the Congo], Katanga, Kolwezi, August.1964, number 47, V. Allard leg., genitalia slide number 16/022011 I. Lehmann (NMK).

**Description.** Forewing length 15.0 mm (wingspan 37.0 mm); antennae broken. *Head*: cream around eyes and base of antennae, eyes olive with small black spots; antennae bipectinate, branches 5 times width of shaft, tips with long scales; shaft and branches densely covered with pale ochre scales dorsally, distance between branches at base equal to the width of the branch, all branches strongly bent towards apex of antenna; labial palpi longer than diameter of eye, light-ochre dorsally, with long hair-like scales ventrally. *Thorax*: patagia and tegulae light-ochre with cream tips, glossy. Femora, tibiae and tarsi of hindlegs cream with two pairs of tibial spurs, medial pair 1.9 mm long, apical pair 1.5 mm long, covering first tarsomere, the distance between spur pairs about 2.6 mm. Forewing: upperside light-ochre; costal margin with patches of dark ochre; a small discal spot of dark ochre in the centre of median cell; an oblique and slightly waved subterminal line of dark ochre from costa to the end of CuA<sub>2</sub>; ciliae of wing margins long, 1.5 mm, cream, glossy. Underside cream, glossy. Wing venation very similar to *S. timberlakei* (Fig. 6). Hindwing: upperside cream-ochreous, glossy; cilia long, 1.8 mm; underside as in forewing. *Abdomen*: largely light-ochre.

**Male genitalia** (Figs 14, 15). Uncus broad, almost as long as tegumen (ventral view), ventral surface setose, with short and long setae; the two thorn-like setose appendices of valva arising from large plates; arms of gnathos slightly bent dorsally, dentate distally, connected by a narrow band caudally. Saccus finger-like, small, rounded caudally; basal part of tegumen and vinculum forming a firm ring, vinculum divided by a long narrow cleft ventrally; phallus slightly longer than valva, curved, tapering towards apex, bilobed and with a deep cleft apically.

**Female.** Unknown.

**Diagnosis.** *S. oyiekeae* differs from its congeners by distinctly smaller wing size. Also the superficially similar female of *S. fischeri* is much too large in relation to the *oyiekeae* male as to be considered as possibly conspecific (moreover, both taxa do not occur sympatrically). In the male genitalia two characters easily separate this species

from its congeners: i) the two thorn-like appendices of the valva arise from broad basal plates which cover about the half of its surface; ii) membranous distal parts of valva deeply bilobed.

**Distribution.** *Shimonia oyiekeae* sp. n. is known from Lubumbashi and Kolwezi (Katangan Copper Bow, DRC). Lubumbashi (formerly called Elisabethville; altitude 1210–1298 m; average annual rainfall 1270 mm) and Kolwezi (altitude 1448 m; average annual rainfall 1200 mm) are located in the southeastern DRC (Katanga Province).

**Etymology.** The species is named after Dr Helida Achieng Oyieke (NMK, Nairobi) to honour her valuable contribution to many research programmes, to the studies of the first author in Kenya as well as her successful collection management at the NMK.

## DISCUSSION

Most of the Afromontane rain forests are under severe pressure and survive only in protected or rugged, inaccessible areas. A major threat to these forests is their fragmentation due to the establishment of small farms (Bowie & Blom 2004). *Shimonia splendida* is probably under a severe threat in its montane habitat. This is also the case with *S. oyiekeae* sp. n. due to enormous habitat destruction in the “Katangan Copper Bow” sensu François (1973). This area stretches in a broad zone from Kolwezi in the West to Lubumbashi in the East (400 km × 70 km) and is about 250 km southwest from the southern end of the Albertine Rift region. Extraction of heavy metals started a long time ago in Katanga and in the adjacent Zambian “Copperbelt” sensu François (1973). Copper metallurgy has been reported as already existing during the 14<sup>th</sup> century (De Plaen et al. 1982). Today, a unique copper-cobalt flora with a high endemism occurs in these areas (Leteinturier et al. 1999; Malaisse et al. 1999). This copper-cobalt flora might be of less importance for Metarbelidae since the latter are more dependent on the original wet ‘miombo’. Many Metarbelidae species probably no longer exist. For example, in the Copperbelt 51% or 391,400 ha of its ‘miombo’ was deforested between 1937 and 1983 (Lees 1962; Chidumayo 1987). The conservation of species of *Shimonia* East of the arc formed by the Congo River is less of a problem as still large relatively stable or intact swamp forest as well as lowland rain forest blocks remain (Burgess et al. 2004).

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## Seven new species of *Coomaniella* Bourgoin, 1924 (Coleoptera: Buprestidae) with redefinition of species-groups and remarks on distribution and biology

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**Abstract.** Seven new species of the genus *Coomaniella* Bourgoin, 1924 are described from Southeastern Asia; six from the subgenus *Coomaniella*: *C. calcarata* sp. n., *C. communis* sp. n., *C. copipes* sp. n., *C. lingafelteri* sp. n., *C. simulatrix* sp. n., *C. tarsalis* sp. n.; and one from the subgenus *Strbaniella* Jendek & Kalashian, 1999: *C. brevicornis* sp. n. Habitus and diagnostic characters of all species are illustrated. New distributional records are given for *C. biformis* Bílý & Kalashian, 1994; *C. biformissima* Jendek & Kalashian, 1999; *C. kubani* Bílý & Kalashian, 1994; *C. lao* Jendek & Kalashian, 1999; *C. macropus* Théry, 1929; *C. marguieri* Baudon, 1967 and *C. violaceipennis* Bourgoin, 1924. Two species-groups are disallowed: *Marguieri* species-group and *Violaceipennis* species-group and both species *Coomaniella marguieri* Baudon, 1967 and *C. violaceipennis* Bourgoin, 1924 are transferred to *Chinensis* species-group. Collection circumstances and potential adult and/or larval host plant are briefly discussed. The checklist of *Coomaniella* species is given.

**Key words.** Taxonomy, Coleoptera, Buprestidae, *Coomaniellini*, *Coomaniella*, new taxa, distribution, host plants.

### INTRODUCTION

*Coomaniella* Bourgoin, 1924 is the only genus in the tribe Coomaniellini Bílý, 1974. This genus is known only from South and Southeastern Asia and comprises three subgenera: *Coomaniella* Bourgoin, 1924; *Tuberniella* Jendek & Kalashian, 1999 and *Strbaniella* Jendek & Kalashian, 1999. Species of *Coomaniella* are remarkable by the exceptionally large eyes, which are almost touching on the vertex in some males. Some species exhibit extraordinary sexual dimorphism affecting mostly antennomeres and tarsomeres. The genus was recently revised by Jendek & Kalashian (1999). Since then, two other taxonomic papers were published (Jendek 2002, 2005), the first describing *C. janka* Jendek, 2005, the second synonymizing *C. aureopilosa* Théry, 1931 with *C. violaceipennis* Bourgoin, 1924. This paper describes seven new species thus rising the number of species in the genus to 31. The differential diagnosis is based exclusively on the male characters while females of most species can not be reliably distinguished.

### MATERIAL AND METHODS

Subgeneric and species-group subdivision follows those proposed by Jendek & Kalashian (1999). Because all new species are thoroughly illustrated, descriptions are kept brief and focused on the selected diagnostic characters or

characters not apparent from the images. Male genitalia are not used for differential diagnostic because of being very uniform and very feebly sclerotized.

Locality label data are cited verbatim and enclosed in “quotation marks”. Examined material is grouped alphabetically by country. New country and provincial records are highlighted in bold. Distribution is given alphabetically from the country to the next subordinate unit (province). The name spelling for the country and its administrative subdivision is adopted from the Norm ISO 3166-2 published by the International Organization For Standardization (1998).

### ABBREVIATIONS FOR COLLECTIONS

BMNH	The Natural History Museum, London, United Kingdom
CNC	Canadian National Collection of Insects, Ottawa, Canada
EJCB	Collection of E. Jendek, Ottawa, Canada
IEBR	Institute of Ecology and Biological Resources, Hanoi, Vietnam
NMPC	National Museum (Natural History), Prague, Czech Republic

- USNM National Museum of Natural History,  
Washington D.C., USA
- ZFMK Zoologisches Forschungsmuseum Alexander  
Koenig, Bonn, Germany
- ZIN Zoological Institute, Russian Academy of  
Sciences, St. Petersburg, Russia

## COLLECTION CIRCUMSTANCES AND REMARKS ON “RENDEZVOUS” TREE

At present, very little is known on the biology of *Coomaniella*. Specimens of *C. purpurascens* from West Bengal, India, were reported from *Chukrasia tabularis* (Meliaceae) by Jendek (2002). Jendek & Kalashian (1999) reported an *Ailanthus*-like tree as a plant on which adults of *C. biformis* Bílý & Kalashian, 1994, *C. biformissima* Jendek & Kalashian, 1999, *C. kubani* Bílý & Kalashian, 1994, *C. lao* Jendek & Kalashian, 1999 and *C. sausa* Jendek & Kalashian, 1999 were collected in Laos. *Coomaniella janka* Jendek, 2005 was found on leaves of *Rhus* (Anacardiaceae) in Henan, China (Jendek, 2005). Svatopluk Bílý (NMPC) reared specimens of *C. purpurascens* Baudon, 1966 from the wooden pencil about 3 cm in diameter, sold as a souvenir in Thailand (pers.com). In years 2011–2012, collecting expeditions in Vietnam brought, along with new species, additional information on the biology of *Coomaniella*. Large series of specimens of several species were collected in Vietnam in Cuc Phuong National Park, Ninh Binh Province and at two different altitudes, 1422 m and 987 m, in Phia-Oac Mountains, Cao Bang Province (see examined material).

The collecting site in Cuc Phuong National Park was an abandoned orchard. Specimens were found on the *Albizia*-like trees 5–15 m tall and on the nearby vegetation, mostly banana leaves. In the Phia-Oac Mountains, specimens were collected from the small, healthy, roadside trees, 3–5 m tall (Figs 23–30). These trees are named “rendezvous” trees because, typically, specimens of several species were found assembled on them. Though flying very fast, adults dwelled motionlessly for a long time exclusively on the underside of leaves, often many specimens or species side by side. The mating in this position was also observed. Adults were present in the highest abundance during the hottest part of the sunny, sweltering weather, usually between 10 am and 4 pm. They were not observed during cold, rainy or windy days. After visual examination, specimens could be easily collected from the “rendezvous” tree by a sweeping net. Collected specimens were often promptly replaced by newly arriving wave of specimens landing on the tree.

No exit holes or galleries were found on “rendezvous” trees. Adult feeding on leaves was not recorded but is not excluded. The reason for specimens assembling remains unclear. The “rendezvous” trees from the site in Phia-Oac

Mountains, altitude 987 m (Figs 28–30) were determined as *Choerospondias axillaris* (Anacardiaceae), which is native to South, Southeast and East Asia, from India to China and Japan. The undetermined tree from the same locality but altitude 1422 m, seems very similar. So far, all published *Commaniella* host records (see above) pertain to plants with compound leaves.

## TAXONOMIC SECTION

### *Coomaniella* Bourgoïn, 1924

#### Subgenus *Coomaniella* Bourgoïn, 1924

*Biformis* species-group

### *Coomaniella biformis* Bílý & Kalashian, 1994

Fig. 27 (imago in situ)

**Material examined.** VIETNAM: 3 ♂ (CNC, EJC): “N Vietnam, Ninh Binh prov., Cuc Phuong N. Park, N20°21'10”, E105°35'00”, 24-28.iv.2012, alt 440 m, leg. Jendek E., Lingafelter S. & Pham H. T.” **New provincial record**; 1 ♂ (CNC): “N Vietnam, Tam-Dao NP, Tam-Dao env., 8-18.v.2012, 900-1200m, N21°27'38”, E105°38'28”, leg. Jendek E.”; 1 ♀ (CNC): “N Vietnam, Tam-Dao NP, Tam-Dao env., 13-26.vi.2011, 900-1200m, N21°27'38”, E105°38'28”, E. Jendek leg.”.

**Distribution.** LAOS: Bolikhamxai; VIETNAM: Ninh Binh, Vinh Phuc.

### *Coomaniella biformissima* Jendek & Kalashian, 1999

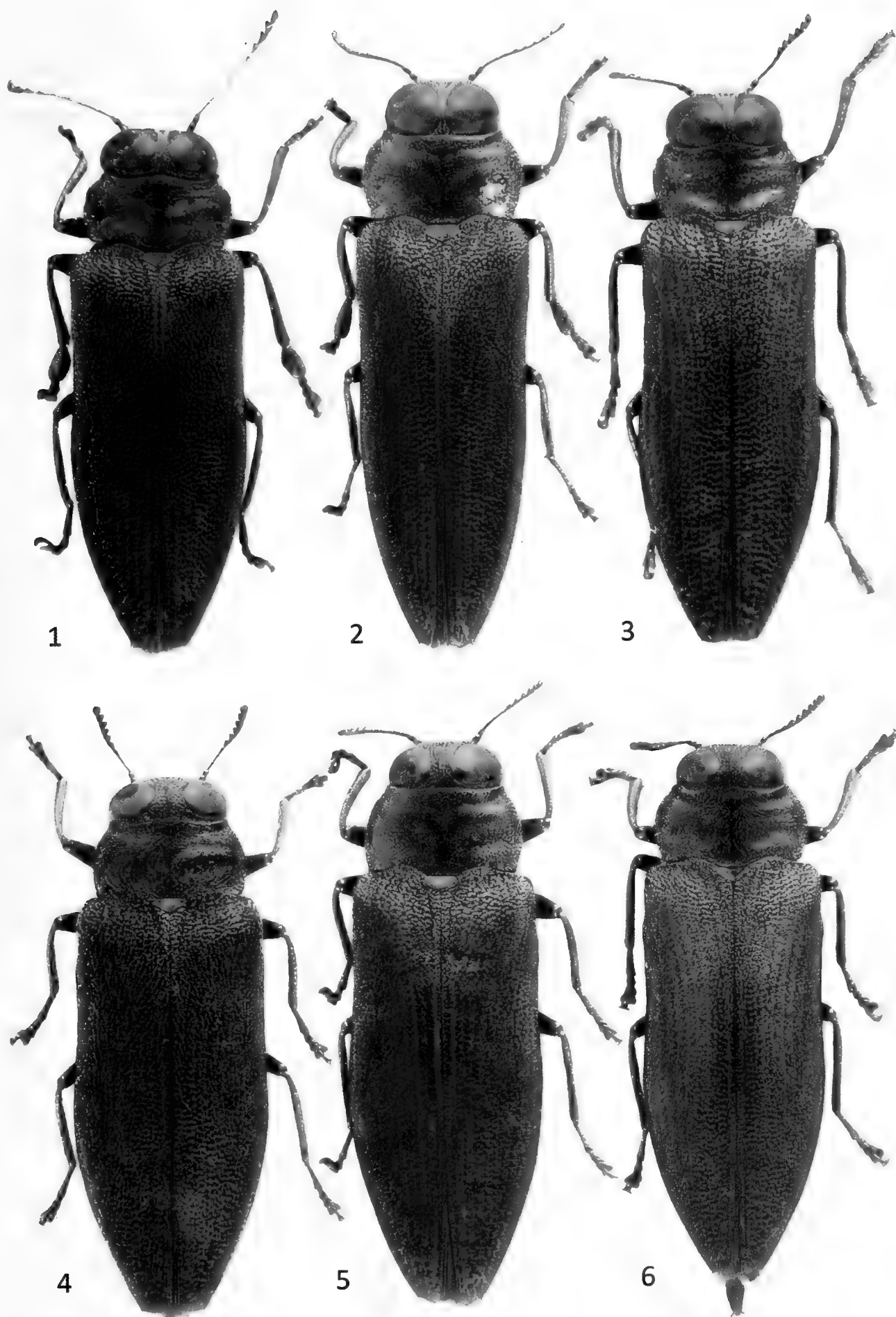
**Material examined.** VIETNAM: 2 ♂, 3 ♀ (CNC, EJC): “N Vietnam, Ninh Binh prov., Cuc Phuong N. Park, N20°21'10”, E105°35'00”, 24-28.iv.2012, alt 440 m, leg. Jendek E., Lingafelter S. & Pham H. T.” **New country record.**

**Distribution.** LAOS: Bolikhamxai; VIETNAM: Ninh Binh.

*Kubani* species-group

### *Coomaniella kubani* Bílý & Kalashian, 1994

**Material examined.** VIETNAM: 2 ♂, 3 ♀ (CNC, EJC): “N Vietnam, Ninh Binh prov., Cuc Phuong N. Park, N20°21'10”, E105°35'00”, 24-28.iv.2012, alt 440 m, leg. Jendek E., Lingafelter S. & Pham H. T.” **New provincial record.**



**Figs 1–6.** Habitus of *Coomaniella*. *C. lingafelteri* sp. n.: 1. Holotype ♂, 6.4 mm 4. Paratype ♀, 6.8 mm; *C. tarsalis* sp. n.: 2. Holotype ♂, 9.6 mm 5. Paratype ♀, 10.8 mm; *C. communis* sp. n.: 3. Holotype ♂, 6.2 mm 6. Paratype ♀, 8.2 mm.

**Distribution.** LAOS: Bolikhamxai; VIETNAM: Lao Cai, Ninh Binh.

***Coomaniella lingafelteri* sp. n.**

Fig. 1 (habitus ♂); Fig. 4 (habitus ♀)

**Description of holotype.** Size: 6.4 mm. **Body.** Frons golden-green; vertex golden-orange; pronotum purple; elytra black-violet with golden-yellow epipleural (anterior  $\frac{3}{4}$  of elytra), humeral and sutural (anterior  $\frac{1}{3}$  of elytra) parts. Dorsal side with short, semierect, pale pubescence. **Head.** Vertex between eyes in narrowest part reduced to 2–3 rows of punctures; antennae very long, reaching to elytral humeri; first antennomere and apical three antennomeres golden-green, remaining ones ochreous. **Pronotum** strongly transverse, widest in middle, sides evenly arcuate, anterior lobe conspicuous, subangulate; disk with obvious, deep, lateral impressions and smaller anteromedial impression. **Scutellum** subpentagonal with obtuse angles. **Elytra** with apices subtruncate and armed with spines on each side, interspace between spines very faintly sinuate. **Tarsi.** Protarsus short, more than twice shorter than protibia; protibia without apical spur; apical, inner margin of protibia with long, erect hairs; tarsomere 1 feebly incrassate, without spine on anterior outer margin, about as long as next three tarsomeres combined; apical inner margin of mesotibia and lateroventral part of mesotarsomere 1 with obvious, long, erect hairs; mesotarsomere 1 strikingly, irregularly incrassate; shorter than following tarsomeres combined. apical half of mesotibia and metatarsomeres 1 with long, sparse, whitish hairs underneath; metatibia with obvious apical spur; metatarsus without distinct modifications; metatarsomere 1 shorter than following tarsomeres combined.

**Variability.** Size: 5.4–7.2 mm. Pronotum varies from golden-orange to purple; lateral spines on elytral apices sometimes obscure or missing; interspace between them sometimes subtruncate. **Sexual modifications.** Females are generally larger and more robust; vertex between eyes in narrowest part reduced to 5–6 rows of punctures; antennae and tarsi without obvious modifications. Ovipositor long and thin.

**Diagnosis.** *Coomaniella lingafelteri* sp. n. belongs to the *Kubani* species-group based on the very long, ochreous antennae and incrassate mesotarsomere 1. It differs from *C. kubani* by having the metallic color of all tarsomeres, which are in *C. kubani* partly ochreous. It can be distinguished from the closest *C. bicolor* Jendek & Kalashian, 1999 by the different dorsal color and by the shape of the incrassate mesotarsomere 1, which is much wider than that in *C. bicolor*.

**Material examined.** **Holotype**, ♂ (CNC): “Vietnam, Cao Bang Prov., Phia-Oac Mountain Rd, 1422 m, +22° 36' 15.60", +105° 53' 0.60", 30 April - 5 May 2012, leg. Jendek, Lingafelter, Pham”. **Paratypes:** 41 (CNC, EJCB, IEBR, USNM, ZFMK) from the same locality as holotype.

**Host plant.** Unknown.

**Distribution.** VIETNAM: Cao Bang.

**Etymology.** Patronymic; the species was named in honour of Steve Lingafelter (USNM), an eminent expert on Cerambycidae, one of the collectors of this species.

*Marguieri* species-group

**Remarks.** This species-group was proposed by Jendek & Kalashian (1999) based on a single available specimen (holotype) of *C. marguieri* Baudon, 1967. Recently collected additional specimens allowed re-examination of the species concept. *Coomaniella marguieri* is transferred to *Chinensis* species-group and the *Marguieri* species-group is disallowed. See also remarks below *C. marguieri*.

*Violaceipennis* species-group

**Remarks.** This species-group was proposed by Jendek & Kalashian (1999) for two species: *Coomaniella violaceipennis* Bourgoin, 1924 and *C. aureopilosa* Théry, 1931. The later was synonymized with *C. violaceipennis* by Jendek (2002). The examination of recently collected specimens revealed that the sole diagnostic character of this species-group, the tridentate elytral apices, is quite variable in *C. violaceipennis*. For this reason the *Violaceipennis* species-group is disallowed and *C. violaceipennis*, because of lacking spine on outer margin of protarsomere 1, is transferred to the *Chinensis* species-group.

*Chinensis* species-group

***Coomaniella violaceipennis* Bourgoin, 1924**

**Material examined.** Vietnam: 5 ♂, 6 ♀ (CNC, EJCB): “N Vietnam, Ninh Binh prov., Cuc Phuong N. Park, N20°21'10", E105°35'00", 24-28.iv.2012, alt 440 m, leg. Jendek E., Lingafelter S. & Pham H. T.” **New provincial record.**

**Distribution.** VIETNAM: Ha Giang, Ninh Binh, Vinh Phuc.

***Coomaniella marguieri* Baudon, 1967**

Fig. 14 (habitus ♂)

**Diagnosis.** *C. marguieri* belongs to the *Chinensis* species-group by lacking the obvious, male sexual modifications on tarsomeres. This species is unique by the following combination of characters: body is dorsally golden-green, pronotum sometimes golden-orange; elytral apices and epipleura with bluish tinge; vertex between eyes in male reduced to 1–2 rows of punctures in narrowest part; antennae and tarsi in male without obvious sexual modifications; protibia and metatibia in male are armed with a long apical spine on the inner side. It can be distinguished by the golden–green color and by the presence of tibial spines from *C. chinensis* Jendek & Kalashian, 1999. By the golden color of ventral side, *C. marguieri* resembles *C. janka*, but it can be distinguished by having the protibial spine and by lacking protruding spine on the protarsomere 1.

**Variability.** Size: 7.2–9.6 mm. Pronotum widest at middle or in posterior third; pronotal sides in male from arcuate to almost straight (holotype); elytral apices bispinose with straight or sinuate interspace.

**Sexual modifications:** Males are generally smaller, slender and more flat than females.

**Material examined.** VIETNAM: 2 ♂, 2 ♀ (CNC, EJCB): “N Vietnam, Ninh Binh prov., Cuc Phuong N. Park N20°21'10", E105°35'00", 24–28.iv.2012, alt 440 m, leg. Jendek E., Lingafelter S. & Pham H. T.” **New country record.**

**Distribution.** VIETNAM: Ninh Binh; THAILAND: Chiang Mai.

**Remarks.** This enigmatic species was described from a single male. Jendek & Kalashian, 1999 redescribed the holotype preserved in BMNH. The holotype is remarkable by having much prolonged elytra and especially the narrow pronotum with the sides almost straight. For this reason, the *Marguieri* species-group was proposed exclusively for this species. Recent finding of additional specimens, including females, revealed that the shape of pronotal sides varies in this species. *Coomaniella marguieri* is transferred to the *Chinensis* species-group (see Diagnosis).

***Coomaniella tarsalis* sp. n.**

Fig. 2 (habitus ♂); Fig. 5 (habitus ♀); Fig. 15 (protarsus); Fig. 22 (mesotarsus)

**Description of holotype.** Size 9.6 mm. **Body** deep-blue dorsally with greenish parts on pronotal sides, across

humeri and along suture in basal 1/3 of elytra; pronotum and elytra with inconspicuous, sparse pubescence; ventral side golden-green. **Head.** Vertex in narrowest part reduced to one row of punctures; antennae not modified, reaching to half of pronotal length. **Pronotum** strongly transverse; sides strongly, evenly arcuate, widest in middle; anterior pronotal lobe missing; anterior margin narrower than posterior; disk with obvious, deep, lateral impressions covered with white efflorescence. **Scutellum** cordiform with truncate anterior margin. **Elytra** with distinct lateral spines on apices, interspace between them obviously sinuate or subangulate. **Tarsi.** Protibia without spur; protarsus as long or longer than half of protibia; protarsomere 1 distinctly incrassate and about as long as following three tarsomeres combined; apical inner side of protibia and lateroventral portions of protarsomere 1 with long, erect hairs, apex of protarsomere 1 truncate without spine on outer side; mesotarsomere 1 obviously incrassate, enlarged apically and about as long as following three tarsomeres combined, apical inner side of mesotibia and lateroventral side of mesotarsomere 1 with long, erect hairs; metatibia on apical inner side with long spur; metatarsomere 1 longer than following tarsomeres combined.

**Variability.** Size: 9.0–11.1 mm. The white pronotal efflorescence is often vanished. Shape of elytral apices varies from bispinose with sinuate interspace to bispinose with subangulate interspace. **Sexual modifications.** Females are generally larger and more robust; narrowest part of the vertex between eyes reduced to 5–6 rows of punctures; pronotum widest in posterior third.

**Diagnosis.** *Coomaniella tarsalis* sp. n. belongs to the *Chinensis* species-group based on the lack of spine on the protarsomere 1. It can be distinguished by the color and by the incrassate pro- and mesotarsomere 1. The female of *C. tarsalis* sp. n. can be recognized from other similar species by the longer metatarsomere 1.

**Material examined.** **Holotype**, ♂ (CNC): “N Vietnam, Ninh Binh prov., Cuc Phuong N. Park, N20°21'10", E105°35'00", 24–28.iv.2012, alt 440 m, leg. Jendek E., Lingafelter S. & Pham H. T.”. **Paratypes:** 5 (CNC, EJCB): from the same locality as holotype.

**Distribution.** VIETNAM: Ninh Binh.

**Etymology.** The specific name is derived from the Greek noun *tarsos* (flat of the foot); it refers to the strikingly modified tarsi of the species.

***Coomaniella communis* sp. n.**

Fig. 3 (habitus ♂); Fig. 6 (hab. ♀); Fig. 18 (mesotarsus)

**Description of holotype.** Size 6.2 mm. **Body.** Head golden-green; pronotum and elytra blue; pronotal sides with golden-blue tinge; ventral side with pale, sparse, semierect pubescence. **Head.** Vertex between eyes in narrowest part reduced to two rows of punctures; antennae reaching to about half of pronotal length. **Pronotum** transverse, distinctly narrower than elytra across humeri, widest in middle; sides strongly, evenly arcuate; disk with obvious, deep lateral impressions, very narrowly separate in middle. **Scutellum** subpentagonal with corners obtuse; impressed on disk. **Elytra** with apices subtruncate and armed with small lateral spines; interspace very faintly sinuate. **Legs.** Protarsus not shortened, longer than half of protibia; protibia and protarsomere 1 without long, whitish hairs, protibia without apical spur; protarsomere 1 very faintly, dorsally incrassate, without spine on outer margin; mesotibia with small, obscure, apical spur; mesotarsomere 1 slightly, ventrally incrassate, distinctly prolonged and slightly subtriangular, with apical inner margin not acuminate, shorter than following tarsomeres combined; apical half of mesotibia and lateroventral portions of mesotarsomere 1 with long, sparse, whitish hairs underneath; metatibia with obvious apical spur; metatarsus without obvious modifications; metatarsomere 1 long but shorter than following tarsomeres combined. **Ventral side.** Basal part of abdomen just behind metaxocae distinctly attenuate.

**Variability.** Size: 5.8–8.2 mm. Elytral pubescence is partly obscure in some specimens; shape of elytral apices varies considerably, lateral spines are obliterate or almost absent, interspace between spine is straight, sinuate or sometimes subangulate.

**Sexual modifications.** Female is generally larger and more robust; vertex between eyes in narrowest part reduced to 5–6 rows of punctures; antennae shorter, legs without modifications.

**Diagnosis.** *Coomaniella communis* sp. n. belongs to the *Chinensis* species-group by the general habitus and by the protarsomere 1 without spine on the outer margin in male. It is very close to *C. chinensis* Jendek & Kalashian, from which it can be distinguished by the less conspicuous pubescence on ventral side; longer and slender legs; apex of mesotibia and mesotarsus 1 with conspicuous, long, whitish hairs on the underside, length of hairs is distinctly longer than diameter of mesotarsomere 1; mesotarsomere 1 distinctly longer and only slightly subtriangular; metatibia in male not bent; metatarsomere 1 distinctly subparallel, longer and more slender; basal part of abdomen just behind metaxocae distinctly attenuate but without medial sulcus.

**Material examined.** **Holotype**, ♂ (CNC): “Vietnam, Cao Bang Prov., Phja-Den environs, 987 m, +22° 34' 35.50", +105° 52' 34.26", 30 April - 5 May 2012, leg. Jendek, Lingafelter, Pham”. **Paratypes**: 314 (CNC, EJCB, IEBR, NMPC, USNM, ZIN, ZFMK) from the same locality as holotype.

**Distribution.** VIETNAM: Cao Bang.

**Etymology.** The specific name is derived from Latin adjective *communis* (common, general); it refers to the amount of collected specimens of this new species.

*Macropus* species-group***Coomaniella lao* Jendek & Kalashian, 1999**

**Material examined.** LAOS: 5 ♂ (EJCB): “Laos NE, Hua Phan prov., 20°19'N, 104°25'E, 25 km SE Vieng Xai (by road), Ban Kangpabong env., 14-18.v.2001, D. Hauck leg.” **New provincial record.** VIETNAM: 4 ♂, 2 ♀ (CNC, EJCB): “N Vietnam, Vinh Phuc prov., Melinh biodiversity station, N105°42'44", E21°23'04", 9-12.vi.2011, 80-200m, E. Jendek leg.” **New country and provincial record**; 2 ♂ (CNC, EJCB): “N Vietnam, Ninh Binh prov., Cuc Phuong N. Park, N20°21'10", E105°35'00", 24-28.iv.2012, alt 440 m, leg. Jendek E., Lingafelter S. & Pham H. T.” **New country and provincial record.**

**Distribution.** LAOS: Bolikhamxai, Houaphan, Louang Namtha. VIETNAM: Ninh Binh, Vinh Phuc.

***Coomaniella macropus* Théry, 1929**

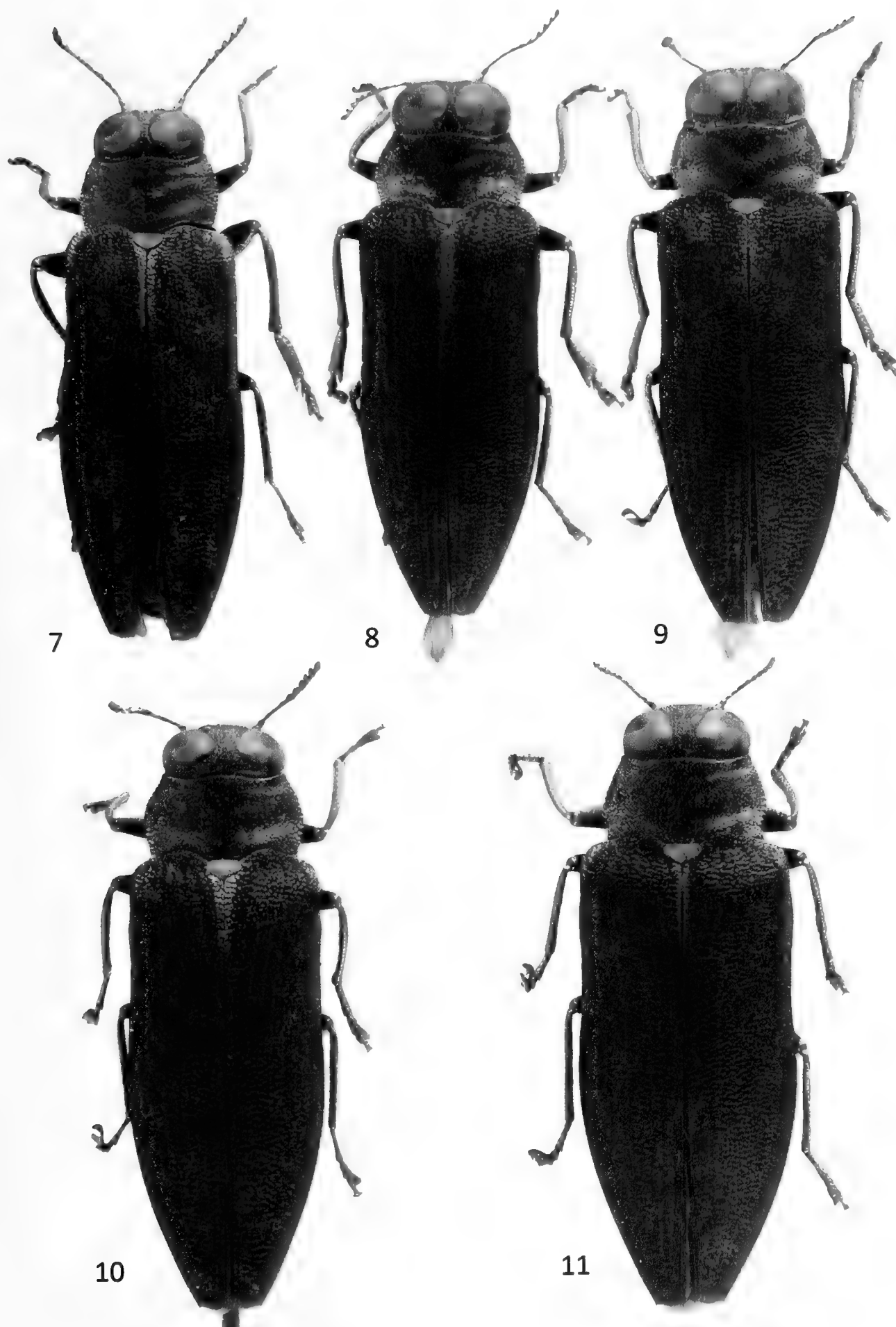
**Material examined.** VIETNAM: 20 (CNC, EJCB, IEBR, USNM): “Vietnam, Cao Bang Prov., Phia-Oac Mountain Rd, 1422 m, +22° 36' 15.60", +105° 53' 0.60", 30 April - 5 May 2012, leg. Jendek, Lingafelter, Pham” **New provincial record.**

**Distribution.** VIETNAM: Cao Bang, Vinh Phuc.

***Coomaniella copipes* sp. n.**

Fig. 7 (habitus ♂); Fig. 10 (habitus ♀); Fig. 20 (mesotarsus)

**Description of holotype.** Size 7.5 mm. **Body.** Head golden-green, pronotum golden with greenish tinge laterally, elytra deeply violet with turquoise epipleural, humeral and sutural margins, sutural coloration in form of sharply delimited narrow wedge reaching to one fourth of anterior elytral length. **Head.** Vertex between eyes in narrowest



**Figs 7–11.** Habitus of *Coomaniella*. *C. copipes* sp. n.: 7. Holotype ♂, 7.5 mm 10. Paratype ♀, 7.6 mm; *C. calcarata* sp. n. 8. Holotype ♂, 9.0 mm; *C. simulatrix* sp. n.: 9. Holotype ♂, 7.8 mm 11. Paratype ♀, 8.7 mm.

**Table 1.** Differential diagnosis of *Coomaniella copipes* sp. n., *C. calcarata* sp. n. and *C. simulatrix* sp. n.

	<i>C. copipes</i> sp. n.	<i>C. calcarata</i> sp. n.	<i>C. simulatrix</i> sp. n.
Antennae (length)	reaching to posterior pronotal angles	reaching to half of pronotal length	reaching to half of pronotal length
Pronotum (color)	golden	Dark-violet with golden-green lateral parts	Dark-violet with golden-green lateral parts
Protibia in male (pubescence on apical margin)	absent	present	present
Mesotarsomere 1 in male (shape)	strikingly incrassate, subparallel, apical end obviously wider than basal	strikingly incrassate, distinctly subtriangular, apical end obviously wider than basal	faintly incrassate, slightly subtriangular rarely subparallel, apical end subequal or slightly wider than basal
Mesotarsomere 1 in male (pubescence on ventral side)	absent	present	present

part reduced to two rows of punctures; antennae long, reaching to posterior pronotal angles. **Pronotum** transverse, distinctly narrower than elytra across humeri, widest in middle; sides strongly, evenly arcuate; disk with obvious, deep lateral impressions very narrowly separate in the middle. **Scutellum** subpentagonal with corners obtuse. **Elytra** without obvious pubescence; apices subtruncate, with small lateral spines; interspace very faintly sinuate. **Legs.** Protarsus obviously short, more than twice shorter than protibia; protibia without apical spur and long hairs on apical end; protarsomere 1 incrassate, with the apical spine on outer margin reaching beyond anterior margin of protarsomere 2; mesotibia with long, reddish apical spur; mesotarsomere 1 strikingly incrassate, subparallel, dorsoventrally flattened, longer and wider than following tarsomeres combined, with inner apical angle obviously sharply acuminate, dorsally without obvious pubescence; apex of mesotibia and first three metatarsomeres with long, sparse, whitish hairs underneath; metatibia with apical spur; metatarsus without obvious modifications; metatarsomere 1 about as long as following tarsomeres combined.

**Variability.** Size: 7.5–7.6 mm.

**Sexual modifications.** Female with golden-orange pronotum; vertex between eyes in narrowest part reduced to four rows of punctures; antennae distinctly shorter.

**Diagnosis.** *Coomaniella copipes* sp. n. belongs to the *Macropus* species-group by having the protarsomere 1 with the spine on the outer margin in male. It is very similar to *C. calcarata* sp. n. and *C. simulatrix* sp. n. by the

general habitus and by the form of the male mesotarsomere 1. It can be distinguished by the characters given in the Table 1.

**Material examined.** **Holotype**, ♂ (CNC): “Vietnam, Cao Bang Prov., Phia-Oac Mountain Rd, 1422 m, +22° 36' 15.60", +105° 53' 0.60", 30 April - 5 May 2012, leg. Jendek, Lingafelter, Pham”. **Paratypes:** 3 (EJCB, USNM) from the same locality as holotype.

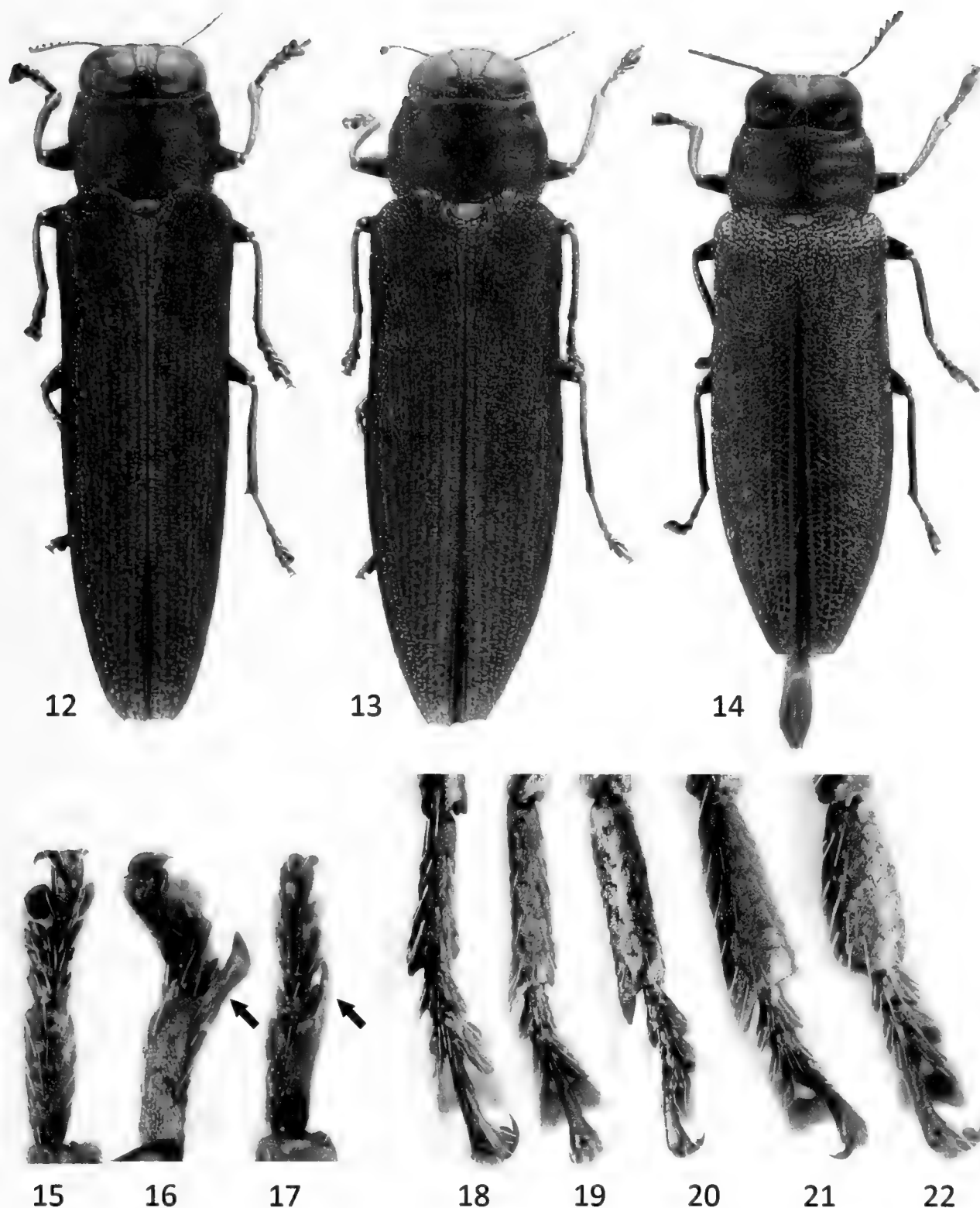
**Distribution.** VIETNAM: Cao Bang.

**Etymology.** The specific name is derived from Latin nouns *copis* (cleaver, knife) and *pes* (foot); it refers to the curiously modified mesotarsus 1 of the species.

***Coomaniella calcarata* sp. n.**

Fig. 8 (habitus ♂); Fig 16 (protarsus); Fig. 21 (mesotarsus)

**Description of holotype.** Size 9.0 mm. **Body.** Head gold-n-blue with golden-green tinge in lower part; pronotum dark-violet with golden-green posterolateral parts; elytra deeply violet with blue epipleural, humeral and sutural margins; sutural coloration in form of vaguely delimited narrow wedge reaching to one fourth of anterior elytral length. **Head.** Vertex between eyes in narrowest part reduced to two rows of punctures; antennae long, reaching beyond half of pronotal length. **Pronotum** transverse, distinctly narrower than elytra across humeri, widest in middle; sides strongly, evenly arcuate; disk with obvious, deep lateral impressions very narrowly separate in the middle.



**Figs 12–22.** Habitus of *Coomaniella*. *C. brevitarsis* sp. n.: **12.** Holotype ♂, 11.0 mm **13.** Paratype ♀, 14 mm; **14.** *C. marguieri* Baudon, 1967, ♂, 7.6 mm; Protarsi of *Coomaniella*: **15.** *C. tarsalis* sp. n.; **16.** *C. calcarata* sp. n.; **17.** *C. simulatrix* sp. n.; Mesotarsi of *Coomaniella*: **18.** *C. communis* sp. n.; **19.** *C. simulatrix* sp. n.; **20.** *C. copipes* sp. n.; **21.** *C. calcarata* sp. n.; **22.** *C. tarsalis* sp. n.

**Scutellum** subpentagonal with corners obtuse. **Elytra** without obvious pubescence; apices subtruncate, with small lateral spines; interspace very faintly sinuate. **Legs.** Protarsus obviously short, more than twice shorter than protibia; protibia with long hairs on apical inner margin, without apical spur; protarsomere 1 incrassate, with obvious apical hook-like spine on outer margin reaching an-

terior margin of protarsomere 3, tip of spine bent inwards; mesotibia with long, reddish apical spur; mesotarsomere 1 strikingly incrassate, strongly subtriangular, dorsally convex, ventrally flattened, longer than following tarsomeres combined, with inner apical angle obviously obtusely acuminate, dorsally with obvious pubescence; apical half of mesotibia and first three metatarsomeres with

long, sparse, whitish hairs underneath; metatibia with apical spur; metatarsus without obvious modifications; metatarsomere 1 about as long as following tarsomeres combined.

**Variability.** Size: 8.7–9.0 mm. The single male paratype differs by blue color of elytral disk and golden-green color of epipleural, humeral and sutural margins.

**Sexual modifications.** Female unknown.

**Diagnosis.** *Coomaniella calcarata* sp. n. is very closely related to *C. copipes* sp. n. and *C. simulatrix* sp. n. by the general habitus and by the form of the male mesotarsomere 1. It can be distinguished from them by the characters given in the Table 1.

**Material examined.** **Holotype**, ♂ (CNC): “Vietnam, Cao Bang Prov., Phia-Oac Mountain Rd, 1422 m, +22° 36' 15.60", +105° 53' 0.60", 30 April - 5 May 2012, leg. Jendek, Lingafelter, Pham”. **Paratypes** (CNC, EJC, IEBR, USNM): 3 from the same locality as holotype; 1 ♂: “N Vietnam, Cao Bang prov., Phia-Oac Mts, Phia-Den env., N22°34'01", E105°52'14", 30.v.-7.vi.2011, 800-1200m, E. Jendek leg.”.

**Distribution.** VIETNAM: Cao Bang.

**Etymology.** The specific name is derived from Latin adjective *calcaratus*, -a, -um (having a calcar or calcaria; spurred); it refers to the obviously spurred meso- and metatibia of the species.

***Coomaniella simulatrix* sp. n.**

Fig. 9 (habitus ♂); Fig. 11 (habitus ♀); Fig 17 (protarsus); Fig. 19 (mesotarsus); Fig. 26 (imago in situ)

**Description of holotype.** Size 7.8 mm. **Body.** Head golden-blue in upper half, golden-green in lower part; pronotum dark-violet with golden-green lateral parts; elytra deeply violet with blue epipleural and sutural margins; sutural coloration in form of very vaguely delimited narrow wedge reaching to one fifth of anterior elytral length.

**Head.** Vertex between eyes in narrowest part reduced to two rows of punctures; antennae reaching to about half of pronotal length. **Pronotum** transverse, distinctly narrower than elytra across humeri, widest in middle; sides strongly, evenly arcuate; disk with obvious, deep lateral impressions very narrowly separate in the middle. **Scutellum** subpentagonal with corners obtuse; impressed on disk. **Elytra** without obvious pubescence; apices subtruncate, with small lateral spines; interspace distinctly sinuate. **Legs.** Protarsus obviously short, more than twice shorter than protibia; protibia with few sparse long hairs

on apical inner margin, without apical spur; protarsomere 1 incrassate, with obvious apical hook-like spine on outer margin reaching anterior margin of protarsomere 3, tip of spine bent inwards; mesotibia with long, reddish apical spur; mesotarsomere 1 strikingly incrassate, finely subtriangular, dorsally feebly convex, ventrally flattened, longer than following tarsomeres combined, with inner apical angle obviously sharply acuminate, dorsally with obvious pubescence; apical half of mesotibia and first three metatarsomeres with long, sparse, whitish hairs underneath; metatibia with apical spur; metatarsus without obvious modifications; metatarsomere 1 about as long as following tarsomeres combined.

**Variability.** Size: 7.2–10.2 mm. Color of elytra varies from blue-violet to reddish-violet, differently colored anterolateral marginal portions of elytra vary in extend from clearly delimited to obscure; incrassation of mesotarsomere 1 faint in some males.

**Sexual modifications.** Female with vertex between eyes in narrowest part reduced to 4–6 rows of punctures; antennae distinctly shorter.

**Diagnosis.** *Coomaniella simulatrix* sp. n. is very closely related to *C. calcarata* sp. n. and *C. copipes* sp. n. by the general habitus and by the form of the male mesotarsomere 1. It can be distinguished by the characters given in the Table 1.

**Material examined.** **Holotype**, ♂ (CNC): “Vietnam, Cao Bang Prov., Phia-Oac Mountain Rd, 1422 m, +22° 36' 15.60", +105° 53' 0.60", 30 April - 5 May 2012, leg. Jendek, Lingafelter, Pham”. **Paratypes**: 102 (CNC, EJC, IEBR, USNM) from the same locality as holotype.

**Distribution.** VIETNAM: Cao Bang.

**Etymology.** The specific name is Latin noun *simulatrix*, -icis which is feminine form of *simulator* meaning pretender. It refers to the similarity of this species with *C. copipes* sp. n. and *C. calcarata* sp. n.

**Subgenus *Strbaniella* Jendek & Kalashian, 1999**

***Coomaniella brevicornis* sp. n.**

Fig. 12 (habitus ♂); Fig. 13 (habitus ♀)

**Description of holotype.** Size: 11.0 mm. **Body** cuneiform, slender; head, elytra, ventral side and appendices golden-green, pronotal sides golden-orange. **Head.** Vertex roughly punctate, in narrowest part between the eyes reduced to 5–6 rows of punctures; antennae very short, reaching scarcely to anterior pronotal corners. **Pronotum**



**Figs 23–30.** Trees and *Coomaniella* specimens in situ. 23–25. “Rendezvous” tree, Phia-Oac Mts, altitude 1422 m; 26. *C. simulatrix* sp. n.; 27. *C. biformis* Bílý & Kalashian, 1994; 28–30. “Rendezvous” tree identified as *Choerospondias axillaris* (Anacardiaceae), Phia-Oac Mts, altitude 987 m.

distinctly narrower than elytra in humeral section, widest at anterior third; anterior pronotal margin subequal to posterior; disk feebly convex, without lateral impressions, anterior angles with small, smooth, shiny portions. **Scutellum** oval with truncate anterior margin and finely impressed disk. **Elytra** roughly, densely tuberculate with striae obsolete; elytral apices subtruncate with lateral spines, outer spine longer than inner one. **Tarsi**. Protibia with short, inconspicuous spur; protarsus distinctly longer than half of protibia; protarsomere 1 not incrassate and shorter than following three tarsomeres combined; apex of protibia and protarsomere 1 without long hairs, apex of protarsomere 1 without spine on outer anterior margin; mesotarsomere 1 faintly incrassate, shorter than following three tarsomeres combined; lateroventral side of mesotarsomere 1 with long, erect hairs; metatibia on apical inner margin with obvious spur; metatarsomere 1 not incrassate, shorter than following tarsomeres combined. **Ventral side**. Last ventrite subtruncate on apex and markedly overlapped by elytral apices, the length of protruded portion is subequal to length of last ventrite.

**Variability**. Size: 11.0–14.0 mm. Two male paratypes have pronotum widest at middle and elytral sides golden-orange.

**Sexual modifications**. Females are generally larger and more robust; head strongly convex; eyes less convex; vertex in narrowest part reduced to 6–7 rows of punctures; anterior pronotal margin distinctly narrower than posterior; tarsi without obvious modifications. Ovipositor long and thin.

**Diagnosis**. This species, together with *C. prolunga* Jendek & Kalashian, 1999, belongs to the subgenus *Strbanella*. The male of *C. brevicornis* sp. n. can be distinguished by the following combination of characters: pronotum and lateral sides of the elytra golden-orange; pronotum in widest part distinctly narrower than the elytra across humeri; pronotal sides less arcuate; disk feebly convex without large lateral impressions; mesotarsomere 1 faintly incrassate, shorter than three following tarsomeres combined and covered with sparse, long, erect hairs; metatibial spur obvious; elytral apices faintly arcuately emarginate or subtruncate with interspace between lateral spines almost straight. The female of *C. brevicornis* sp. n. resembles females of *C. biformis* and *C. biformissima*, but the body is distinctly more slender and less convex, and the pronotum is strikingly less transverse. The female of *C. prolunga* is unknown.

**Material examined**. **Holotype**, ♂ (EJCB): “N Vietnam, Ninh Binh prov. Cuc Phuong N. Park N20°21'10”, E105°35'00” 24–28.iv.2012, alt 440m leg. Jendek E., Lingafelter S. & Pham H. T.”. **Paratypes**: 3 ♀ (CNC, EJCB,

NMPC): “LAOS C., Bolikhamsai pr., Ban Nape env. 7–16.V.2004, alt. 400±100 m, 18°20'N, 105°08'E, E. Jendek & O. Šauša leg.”; 2 ♂ (EJCB, NMPC): “Laos-NE, Houa Phan prov., 20°12–13.5'N, 103°59'.5–104°01'E, Ban Saleuy → Phou Pane Mt., 1340–1870m, 2.–22.vi.2011, Vít Kubán & Lao coll. legit. \ primary mountain forest, individual collecting. Lao 2011 Expedition National Museum Prague, Czech Republic”.

**Host plant**. Unknown. The holotype was collected by sweeping the crowns of *Albizia* like trees. Paratypes from Ban Nape were found laying the eggs into the bark of large trunk of unknown tree.

**Distribution**. LAOS: Bolikhamxai, Houaphan. VIETNAM: Ninh Binh.

**Etymology**. The specific name is derived from Latin adjective *brevis* (short) and the noun *cornu* (horn); it refers to the strikingly short antennae of the species.

**Acknowledgements**. We are particularly thankful to the Institute of Ecology and Biological Resources (IEBR), Vietnam Academy of Science and Technology (VAST) for giving us the opportunity to perform the research. The present study was partially supported by the project of the Department of Insect Systematics, IEBR, and National Foundation for Science and Technology Development (NAFOSTED–106.12–2012.63). All collection curators are sincerely acknowledged for their help in accessing the specimens. I thank Aleš Smetana, Vasily Grebennikov (both Ottawa, Canada) and Steve Lingafelter (USNM) for consultation and comments on the early version of the manuscript. Sincere thanks also due to a botanist Nguyen The Cuong (Institute of Ecology and Biological Resources, Hanoi, Vietnam) for determination of the tree *Choerospondias axillaris*. I thank the Candian Food Inspection Agency and USDA Agriculture Research Service and US Forest Service, International Programs, for funding travel and logistical support in Vietnam.

## CHECKLIST OF THE GENUS *COOMANIELLA* BOURGOIN, 1924

### Subgenus *Coomaniella* Bourgoin, 1924

#### *Biformis* species-group

*C. biformis* Bílý & Kalashian, 1994

*C. biformissima* Jendek & Kalashian, 1999

#### *Modesta* species-group

*C. modesta* Bourgoin, 1924

*C. purpurascens* Baudon, 1966

#### *Kubani* species-group

*C. bicolor* Jendek & Kalashian, 1999

*C. kubani* Bílý & Kalashian, 1994

*C. lingafelteri* sp. n.

*Siniaevi* species-group

*C. siniaevi* Jendek & Kalashian, 1999

*Chinensis* species-group

*C. chinensis* Jendek & Kalashian, 1999

*C. communis* sp. n.

*C. marguieri* Baudon, 1967

*C. tarsalis* sp. n.

*C. violaceipennis* Bourgoïn, 1924

*Macropus* species-group

*C. calcarata* sp. n.

*C. copipes* sp. n.

*C. daoensis* Jendek & Kalashian, 1999

*C. isolata* Jendek & Kalashian, 1999

*C. janka* Jendek, 2005

*C. lao* Jendek & Kalashian, 1999

*C. macropus* Théry, 1929

*C. nativa* Jendek & Kalashian, 1999

*C. orlovi* Jendek & Kalashian, 1999

*C. pacholatkoi* Jendek & Kalashian, 1999

*C. simulatrix* sp. n.

*C. sausa* Jendek & Kalashian, 1999

## Species incertae sedis

*C. jeanvoinei* Théry, 1929

*C. marseuli* Obenberger, 1940

**Subgenus *Tuberniella* Jendek & Kalashian, 1999**

*C. abeillei* Obenberger, 1940

*C. taiwanensis* Baudon, 1966

**Subgenus *Strbaniella* Jendek & Kalashian, 1999**

*C. brevicornis* sp. n.

*C. prolonga* Jendek & Kalashian, 1999

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# Bonn zoological Bulletin (BzB)

## Instructions to authors

### Scope

The **Bonn zoological Bulletin** (BzB), formerly “Bonner zoologische Beiträge”, is an international, peer-reviewed, open access journal publishing original research articles, reviews, and scientific notes dealing with organismal zoology. Focus of the BzB are (1) taxonomy, (2) systematics and evolution, and (3) biodiversity and biogeography, all with respect to terrestrial animals. Terrestrial animals as understood here include those inhabiting fresh or brackish waters. Contributions from related fields like ecology, morphology, anatomy, physiology or behaviour are welcome when of clear relevance to the focus topics.

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**Format** Typing should be double-spaced in 10 pt throughout the text, including tables, figure legends, and reference list. Pages and lines should be numbered consecutively. Short subheadings may structure the text into sections. Do not number headings or subheadings.

**Structure** Research articles should be organized as follows: Title, Author(s), Address(es) including email address and telephone, Abstract, Key words, Running Title, Introduction, Material and Methods, Results, Discussion (or combined Results and Discussion), Conclusions (optional), Acknowledgements, References, Tables, Figure Captions, Figures (separately numbered and identified), Appendices (if necessary). Footnotes should not be used except in Tables.

**Title** The title should be brief (30 words limit, ideally shorter) and indicate clearly the field of study and group of animals investigated. The systematic position of taxa listed in the title must be indicated (e.g. “Squamata: Colubridae”). A Running Title (maximum 45 characters inclusive of spaces) should describe the paper's core topic.

**Abstract** Each manuscript should contain a concise abstract as single paragraph (max. 200 words) summarizing the significant findings, followed by not more than six key words.

**References** In the text, cited sources should be referred to as follows: Ax (2001), Kim & Lumaret (1989), Holm et al. (1997) – for three or more authors, or, if cited consecutively: (Ax 2001, 2002; Holm et al. 1997; Kim & Lumaret 1989) – please follow exactly the use of commas and semicolons. Do not use commas between author and year (only exception: taxonomic names, in which a comma is placed between author and year).

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Kottelat M, Whitten T, Kartikasari SN, Wirjoatmodjo S (1993) Freshwater fishes of Western Indonesia and Sulawesi. Periplus Editions, Hong Kong

Mayr E (2000) The biological species concept. Pp. 17–29 in: Wheeler QD & Meier R (eds.) Species Concepts and Phylogenetic Theory – A Debate. Columbia University Press, New York

Parenti RP (2008) A phylogenetic analysis and taxonomic revision of ricefishes, *Oryzias* and relatives (Belontiiformes, Adrianichthyidae). Zoological Journal of the Linnean Society 154: 494–610

Sullivan J (1994) *Bufo boreas*. In: Fire Effects Information System (U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory). Online at <http://www.fs.fed.us/database/feis/animals/amphibian/bubo/all.html> last accessed on December 28, 2009

Sztencel-Jablonka A, Jones G, Bogdanowicz W (2009) Skull morphology of two cryptic bat species: *Pipistrellus pipistrellus* and *P. pygmaeus* – a 3D geometric morphometrics approach with landmark reconstruction. Acta Chiropterologica 11: 113–126

Authors are kindly requested to make sure that sources listed in the References match those cited in the text. Names of persons who provided unpublished information should be cited by including the initial(s) and city as follows: “(JG Frommen, Bonn, pers. comm. 2009)”.

**Tables and Figures** Tables and Figures should not duplicate information provided in the text. Tables should be numbered consecutively in Arabian numbers in order of their mention in the text (Table 1, Tables 1–3; do not abbreviate “Table(s)”). A brief self-explanatory title should be typed directly above each table, not on a separate page. Do not insert frames, vertical rules, dotted lines or footnotes. Figures (maps, graphs, charts, drawings, photographs etc.) must be numbered consecutively using Arabian numbers in order of their mention in the text (abbreviate “Fig. 1”, “Figs 1–3” etc. in the text, but use the full term “Figure(s)” in the captions. If referring to illustrations in cited sources, use “fig. / figs”. Grouped figures should be lettered with a lower case block letter in the lower left corner. Scale should be indicated on figures by a scale bar. A fully descriptive caption of each figure should contain all relevant information; captions are to be typed together on a separate page. Colour figures will be published free of charge if contributing significantly to quality and / or readability of the manuscript. The decision to print in colour or black and white any figure submitted in colour will generally be based on the referee's and handling editor's recommendations, but remains with the editor-in-chief and publisher. If appropriate, authors may be asked to group single colour figures into plates. For review, tables and figures should be enclosed to text (preferable one electronic file per manuscript), but may alternatively also be submitted as separate files (jpg, pdf, tiff). At this stage, illustrations of low resolution allowing the referees to follow the contents are sufficient; high-resolution files (jpg, pdf, tiff of photographs, maps etc. at  $\geq 300$  dpi; line artwork etc. at 600 dpi or in eps format) will be requested after acceptance. Unless otherwise agreed with the editor, single electronic submissions should not exceed 6 MB file size.

**Appendix** Appendices should be numbered consecutively in Roman numbers, in order of their mention in the text (Appendix I, Appendices I–VI).

**Abbreviations** Except of very common abbreviations such as mm, kg etc.; all abbreviations should be explained in the Methods section or figure legend if appropriate. Hyphenation or upper case letters for entire words are not permitted. All measurements must be metric units and given to the same decimal, i.e., 5.3–6.0 mm (not: 5.3–6 mm).

**Taxonomy** Names of animals and the description of new genera or species must follow the current version of the International Code of Zoological Nomenclature (ICZN, available at <http://www.iczn.org/iczn/index.jsp>). Type specimens should be deposited in recognised institutions; deposition at ZFMK is highly appreciated. Italics are required for species names which are written in full the first time they appear in the text, e.g. *Carassius auratus* (Linnaeus, 1758), but abbreviated at subsequent mention, e.g. *C. auratus*. List names in synonymies as follows: *Attelabus asparagi* Scopoli, 1763 (Scopoli 1763: 36, fig. 113.), and list the source under References. Dichotomous keys are desirable in taxonomic papers.

**Statistics** Statistics presented should include the name of the test, number of observations or degree of freedom, and probability level ( $P > 0.05$ ,  $P < 0.05$ ,  $P > 0.001$ ,  $P < 0.001$ ). Values of test statistics are not required.

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8. Is the length of the paper appropriate?
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Cover illustration:  
*Coomaniella communis* Jendek & Pham (this volume, pp. 111–123)

